THE CULTIVATION

OF

Fruit Trees and Shrubs

BY

ALEC SANTERRE

> " Qui laboure les arbres, les prie de porter ; qui les fume, les supplie ; qui les taille, les contraint."
>
> COLUMELLE.

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PREFACE

Our object in presenting to the public this modest treatise on fruit trees, is to popularize the culture of these trees, which once well understood, cannot fail to become a source of large revenue to all who devote themselves to it. For far too long a period have the farmers of the Province of Quebec neglected this matter and even in our day, the cultivation of fruit trees is carried on in a very small way, and principally in the vicinity of large centers. Still owing to the increased facilities of communication, the value of fruit has considerably improved and the receipts from a well planted piece of ground add materially to the revenue of the farm, as every one will eat fruit, when obtainable at a reasonable price.

The intelligent cultivation of fruit trees may become one of the most lucrative branches of agriculture. It has even been remarked that one of the most striking signs of the degree of comfort and morality existing among the population of a village, is to see it surrounded by well kept gardens and orchards. The possibility of the profitable cultivation of fruit trees in the Province of Quebec was a matter of doubt. It will be seen in the following chapters that, although the rigors of the climate prevent the cultivation of every kind of fruit, sti[illegible]ield of operation is sufficiently large and the numbers of kinds of fruit, which will give profitable returns, is sufficiently great, to induce the intelligent farmer to endeavour to share with others the advantages to be derived from this branch of agriculture. With the assistance of Government grants, experiments have been tried in various parts of the Province. The object of these experiments was rather to obtain knowledge than profit and to demonstrate to the public that certain regions of the country were favorable to the cultivation of fruit trees and of what varieties. The various reports, made up to the present time, allow of no further doubts as to the quality of the soil, or the possibility of raising trees, provided always that the operation is confined to the cultivation of hardy varieties, perfectly acclimated. Information on this subject will be found further on. A thing much to be desired, and upon which every one is agreed, is that the children of our villages should have correct ideas of the science and art of the cultivation of the ground. By exercising their intelligence on these interesting subjects, we will raise in their estimation, and cause them to love, an employment which practice and ignorance have brought down to the level of a coarse and laborious task; little by little without trouble they will become attached to it and in time to come we will not have to sigh over the desertion of the labourer from the fields for the towns. This is a point which is admitted by every sensible man. It remains now to be seen whether the teachers are capable of immediately affording this elementary instruction. They are not, most of them, being themselves unskilled, but they should all be able to become so within a very short time. Now, the object of the present work, is one of the most agreable and attractive branches of agriculture. The science of the cultivation of fruit trees, will expand the intellect and develope good taste. In this respect therefore it is worthy of our best attention, for to secure success, work alone is not sufficient, there must also be the desire for success. From another point of view the cultivation of fruit trees can never be a matter of indifference.

The fruit trade of Canada has developed into enormous proportions and in all the Provinces of the Dominion, its cultivation is increasing more and more, so as to obtain a share of the profit it produces, due to the high position held by canadian fruit in foreign markets. The new fruit plantations in British Columbia cover hundreds of thousands of square feet.

Lastly there is the local market, which should not be neglected. We cannot expect to see our fruit arrive at maturity during the first days of summer, but it must not be forgotten that if it only arrives later, it has the double advantage of being delivered newly gathered and of being ripened on the tree, and that consequently the particular flavour of all fruit, arrived at maturity under natural conditions, cannot fail to command a renumerative price even in our own markets.

Upon this subject and in conclusion we will give the very correct ideas published by the inspector of the experimental stations of fruit Arboriculture in the report of the Department of Agriculture of Quebec. He wrote :

"I am convinced that the raising of trees at the stations is instructive and beneficial to farmers in general, who do not understand what a nursery of fruit trees is. This intelligent and laborious class have not had the advantage to learn that the trees which they get from Ontario at 30 to 50 cents each would not cost them more than 5 to 6 cents of disburement and labor if they bought the grafts and cultivated them with the same care as they do a bed of vegetables.

"It is estimated that the fruit trees annually imported by us from abroad number 200,000 and cost our farmers and other proprietors $60,000 on the average or nearly $1,000 per county. This is an enormous tribute to pay to strangers for trees reared in over rich soil and forced to excess by means of solid and liquid manures, which renders them too tender to support our severe winters. It is calculated that not one fifth of the apple-trees, brought here from the west, survive. The net loss to the Province, through the purchase of these trees, is valued at half a million dollars in ten years and this estimate is below the real loss. These losses have the bad effect of discouraging a great many proprietors, who remain under the mistaken impression that our climate is too severe for fruit culture.

"The best way to lessen our imports and to retrieve the immense losses sustained by proprietors would be instruction in the art of grafting, the distribution of grafts by the Government* and by the agricultural and horticultural societies and the establishment of larger nurseries at the experimental fruit stations, where the public would learn the economical way to grow trees in the nursery and where the farmers could also procure trees suited to the soil and climate of their locality. A little aid granted to the managers of the stations would enable them to rear trees for the stations which the Government might establish later.

" This question is so important that I deem it my duty to submit it, with the conviction that it will receive from you all the consideration which it deserves.

" The more the people are educated in fruit cultnre, the more will they appreciate the products of our commercial nurseries and will these be encouraged in preference to the foreign nurseries which last year had 330 agents selling their fruit trees in our province.

" The agricultural lecturers can be of great aid to horticultural instruction. Dr. Grignon, M. C. A. of Terrebonne, has himself planted and given away several thousand grafts to farmers' clubs, besides teaching their cultivation. His efforts and his generosity have been crowned with remarkable success. A great many orchards have sprung from the grafts distributed by him.

" In six counties to the east and north east of Montreal to Fraserville in the south and to Murray Bay north of the St. Lawrence, it must be admitted that fruit culture has retrograded ; the art of grafting, in which our forefathers were skilled, is practised at present by very few.

" Our ancestors sowed the apple pippins and grafted the seedlings ; they sowed the stones of plums and cherries and thus raised long-lived trees; while we neglect these excellent practices.

" Our ancestors planted their orchards in new land, rich in ashes, potash and humus; we plant ours too often in worn out land, where the trees perish of hunger. We plant in poor and badly prepared soil, trees grown in the rich earth of the nursery; they consequently suffer and fade away. We plant trees of slow growth, which produce their fruit late, such as the Baldwin and the Greening, which cannot adapt themselves to our short summers and long winters.

" This state of affairs is deplorable; I have noted it seriously, after being myself the victim of the same blunders and I acknowledge the fact frankly." (Report of Mr. Auguste Dupuis 1902).

In this respect, that is from the point of view of local comsumption much can be done and it will be no small satisfaction to the author if, in publishing this work, he succeeds in establishing the importance of the cultivation of fruit trees and the advantages to be derived from the same.

THE CULTIVATION OF FRUIT TREES AND SHRUBS

THE CONSTITUTION OF FRUIT TREES

Before entering into the detail of the cultivation of fruit trees and of the various operations connected with it, it will be well to give some ideas upon their constitution, their manner of living and their growth. It is always well to understand the nature of the objects we are attending to and from which we desire to obtain the best results.

A *tree* is the product of a seed. The seed is that part of the fruit which contains the elements of the reproduction of a new vegetation similar to that from which the tree itself has sprung.

The seed is composed of two parts : 1° the kernel ; 2° the shell which encloses it.

The kernel contains the embryo, which is formed : 1° of the radicle, or rudiment of the roots ; 2° of the germ or rudiment of the stem, and 3° of one or several cotyledons or seed-leaves.

A seed, of perfect constitution and maturity, to germinate and give birth to a new plant should be put under the influence of a certain temperature in contact with the air and moisture.

If it is planted in moderately damp ground, it swells, through the absorption of water, bursts its shell and gives passage to the radicle which attempts to sink into the earth to form roots and to the germ which raises itself out of the ground to form the stem of the plant.

The Root.—In fruit trees, which are now under consideration, the root is the part which points down into the ground. It serves to fix the plants in the ground and to draw from the soil the elements necessary to their nutrition.

Its developement is generally in proportion to the height and size of the plant from which it has sprung, increasing in size in the same proportion as the latter.

The root is divided into three parts : 1° the body or tap root ; 2° the comose ; 3° the neck.

The tap root is the principal portion of the root. It is the first to appear when the formation of the root begins. Often in certain plants it disappears some time after its formation and is replaced by branching or secondary roots.

The comose takes the form of small slender fibres growing from the secondary roots. The comose is the important part of the root. The absorption of the fluids which nourish the plants takes place through the spongioles at the extremities of these radicles or this comose or from the surface of the same.

The spongioles are not special organs, they are the root extremities themselves in process of formation. They possess a considerable power of absorption, which increases at the same time as the vital energy of the plant.

The neck is the point from which the root starts and the stem rises upwards.

It is an ideal plan which it is impossible to determine anatomically, it is not even always easy to fix it precisely by the eye. In arboriculture however it has been agreed to fix the place exactly above the point where the first roots take their birth upon the body of the tree.

With reference to their direction the roots are tapping roots when they grow down vertically into the ground; obliques, when they depart from the vertical direction and sloping, when they grow out close to the surface of the ground.

We have already stated that the functions of the roots were to fasten the plant in the ground and through their spongioles to draw from the soil a part of the nourishment necessary for the preservation and support of the plant. The land should be properly prepared; in a loose soil the roots develope more easily, acquire strength faster and the comose becomes more abundant. With reference to the tillage of the ground such as breaking up, hoeing, manuring, &c., care should be taken to ascertain whether the trees, to be worked upon are tap rooted, or have roots running near the surface of the ground, so that the latter may not be injured.

Although it cannot be stated as a general rule that the dimensions of roots are in exact proportion with those of the branches, it is still no less true that very often the volumes correspond, so the more roots there are to a tree, the more branches will it have and vice versa. Still many circumstances, either meteorological, or connected with the cultivation, tend to cause a variation in this rule.

The stem or trunk.—The stem or trunk of the tree is the portion opposite to the root; it rises in the air and is naturally vertical in the trees which now occupy our attention.

Generally the stem separates into different parts, these separate parts take the name of boughs and branches; they vary in size according to the age of the tree and their distance from the main stem; upon these grow smaller branches, and twigs, which form their extremities.

The stem is composed of 1° the bark, 2° the wood, and 3° the medullary canal.

The bark between the outer and the inner surface, comprises: 1° the epidermis, which covers every part of the plant, but which is not always permanent; 2° the herbaceous covering, which shows a greenish colour and in which the true sap is contained and 3° the liber, which, composed of several layers closely connected together, is in immediate contact with the sap wood.

The Wood.—In the wood there is the distinction between the sap wood, and the true wood.

The sap wood is the youngest part of the wood. It is formed of concentric layers generally of a lighter colour than the true wood or heart of the tree and is less firm in tissue.

As the tree grows older the sap wood becomes wood, commencing at the inner layers and increasing in hardness.

The Medullary Canal. — It occupies the center of the stem and contains the medulla or pith, which is particularly plentiful in the younger parts of the wood. From the pith emanate the medullary rays which go as far as the exterior of the sap wood.

Leaves and buds.—The leaves grow round the stem and branches. Leaves are generally green, a colour which they only lose when they die or are attacked by disease. The base of the leaf usually terminates in a stalk called a petiole.

Leaves form during the first year of vegetation. The frame of the leaf is constructed of a fibrous vascular tissue called the nerves, the spaces between which are filled in by a substance called parenchyma ; the whole is covered over by an epidermis or skin and is called limb : on the two sides of the leaf, but particularly on the lower side there are numerous small openings called pores by which the interior is connected with the atmosphere.

The leaves, through their pores, absorb the fluids contained in the air, which may be useful to the nourishment of the plant and throw off those which have become useless. Besides their functions of absorption and rejection, the leaves also perform the function of respiration by modifying the liquids absorbed ; they are therefore of the greatest utility to the life of the plant.

The bud appears at the axil of the leaf and at the extremity of the branches in the form of a small ovoide body. It is a small branch, not yet developed, covered with scales which protect it from the rigours of winter and from the various atmospheric agencies.

Buds develope into boughs and branches when the season restores vegetation. There are certain buds which contain only leaves, others only flowers, while others again enclose both. In arboriculture, the first are called eyes and the second and third, gems.

The flower.—Independently [illegible] organs referred to, which contribute to the developement of the plant, there are others which contribute to its reproduction, to which we will briefly refer, only pointing out their essential parts.

The organs intended for the reproduction of the plant are the flower and the fruit. Examined from the exterior to the enterior the flower is composed : 1° of an envelope generally green in color, called a *calice* (or cup) ; 2° of a second envelope almost always coloured, called the corolla or petal ; 3° of a certain number of small filaments, each terminating in a slight enlargement containing the fecundifying dust or pollen : these are the stamens or male organs of the flower ; 4° lastly, at the center, of one or more organs, united together, this is the pistil or female organ, it encloses the young seed or ovules, which by fecundation become the fruit.

The flower is male, if it has only stamens, female if it has only a pistil ; hermaphrodite, if these two organs are joined together. This latter condition is the most general and the most favorable to fertility. Both male and female flowers may appear upon the same tree, as in the walnut tree, the hazel and others. The tree is then said to be androgynal. If the male and female flowers are on separate trees, as in the date, the pistachio-tree and others, the tree is dioic.

For a flower to give fruit or fertile seed, the pollen from the stamens must have impregnated the pistil. If during the flowering season, some obstacle, such for example as a long and cold rain, should prevent this influence of the pollen on the pistil, fecundation would not take place, the flower would drop off and the fruit would not develope.

Fruit.—After fecundation the lower portion of the pistil, that is the ovary, enlarges and forms the fruit, which contains the seed, the fruit is then said to have knotted.

The Manner of Nutrition.

The upper part of the tree is in contact with the air, the lower part with the soil. The leaves, by their pores, as well as the young herbaceous parts, absorb the gases and the moisture contained in the atmosphere ; the roots through their spongioles absorb the water from the ground which holds in solution various substances useful to vegetation. This liquid takes the name of sap, it furnishes the nutritive principle to the plant.

The sap has two well defined currents, the one ascending, the other descending. The ascending sap rises with great rapidity through the wood layers and especially through the young wood. This ascending force depends upon a number of causes, principally upon atmospheric circumstances, the action exercised by the leaves, through exhalation and perspiration, the phenomenon of attraction known to physiologists as endosmose and capillary attraction all take part in it. The sap always rises better in the vertical parts of the tree. Later on it will be seen how much attention should be given to this property, in the pruning of the tree and training the branches. Besides this ascending movement, the sap also moves laterally, it therefore permeates the whole vegetable tissue, without any fixed channel ; obstacles encountered causing it to deviate. The rising of the sap commences in the spring and it is then at its greatest strength. The dry weather and the decreasing action of the leaves, weaken it little by little and cause it to cease almost entirely by the end of the summer. Still in the month of August, in some trees it commences to run again with renewed strength, among others, in the pear tree when its growth commences early in the season or when dry summer is succeeded by rainy weather. This renewed rising of the sap, called the August sap, is some times strong enough to develope new buds. In any case the formation of the organs of the tree finishes at this season. The wood is then said to be ripe.

The ascending or raw sap is not suitable for the nourishment of the plant ; it would not be sufficient for the parts in the act of growing. But once it reaches the branches the sap spreads through the leaves, where, coming into contact with the air which penetrates to the interior of the latter through their pores and influenced by the respiration of these organs, by the heat and especially by the light, it undergoes an important change : A part of the water is thrown off, it thickens, takes on new properties and descends from the leaves towards the roots, circulating through the layers of the liber by special channels. This descending sap, thus elaborated by the leaves, forms the *cambium* a nutritious juice which serves essentially to the nourishment and growth of the tree. Each year the *cambium* forms a layer of sap-wood and a layer of liber. The latter, extremely thin is less apparent than the former. The descending sap does not always descend, at least not entirely, it often takes a different direction. It goes to the growing portions of the plant, such as the top of the stem and the extremities of the branches, while still supplying the generative layer of new wood and new bark and the matter for the lengthening of the roots. The growth of plants and the successive developement of all their organs are the result of these various phenomena.

We only desired here to give a brief sketch of the way in which trees live ; we will again refer to this subject when occasion may require. But if an intimate knowledge of vegetable life is desired, a reference to treatises on botany is indispensable.

THE SELECTION OF TREES

Planting.

In a climate so rigorous as ours, the selection of trees is of such paramount importance, that, if wrongly made, success is impossible. It is not only necessary to make selection of varieties yielding well in our latitude, they must also be thoroughly acclimated. This fact, known to all who have practiced fruit arboriculture, must never be lost sight of by those who, in the future, may wish to devote themselves to this species of cultivation both in an intelligent and profitable manner.

In his practical advice on the management of fruit trees and shrubs, Mr. Cy. Renaud, nursery-man of the Trappists of Oka, thus expresses himself :

" A great number of the disappointments, suffered by our farmers, arise in most cases from the fact that they have allowed themselves to be over-reached by enterprizing agents, who, having only their own interests in view, care very little whether they furnish them a profitable orchard or not, or sometimes even the articles which they have bought. These set-backs have taught wisdom to a great number who are themselves able to judge what are the best suited to our climate. The careful nursery-man, who makes a speciality of this culture, and has a knowledge of the fluctuations of the market, is in a better position than any one else to instruct the farmer in his selection of varieties. The latter should therefore apply to some honorable and well established house and trust to it as to the varieties which he should plant."

Mr. George Moore says :

The example of those who succeed, through the judicious choice of varieties best suited to the locality and through the care now devoted to their cultivation, acts as an encouragement to those who have hitherto hesitated to commence the creation of an orchard. Unfortunately ignorance of the most elementary principles, is often the cause of failure ; there is however another, it is the over confidence which one is inclined to place in the recommendations of certain persons, who in the first place, have not the necessary knowledge to advise in the choice of varieties best adapted to the conditions of the soil and climate, and in the second, have only one object in view, that of earning their commission by the sale of the trees at their disposal.

Thousands of dollars are thus wasted, every year, to the great discouragement of those who attempt the growing of apple trees, without speaking of the damage suffered by honest nursery-men, who take serious interest in their business and endeavour to do justice to the public.

In the preface to this work, we have already cited the opinion of Mr. Auguste Dupuis, manager of the experimental fruit stations, warning the public against the importation of trees, which raised in a milder climate, are unable to stand the severity of our winters. The practice of the principle, "that only acclimated varieties and stock should be accepted," is therefore a condition essential to success.

This does not absolutely imply that foreign varieties cannot be planted here. Not at all, as the case frequently occurs, but it is better for the farmer to allow the nurseryman to take the risk of these experiments than to take them himself.

The taking up.—The success of the growing of fruit trees depends largely on the care bestowed upon their planting The change attendant upon their removal from the nursery necessitates attention in the manner of replanting, so as to assure their taking, to hasten the formation of the root fibres and to cause them to take on in the following years as rapid a growth as the quality of the land will allow. The first condition to be observed is the proper pulling up or rather the removal of the tree : too much care cannot be taken to avoid the injuring or breaking of the roots, accidents of great frequency. Certain it is that the less accidents of this kind, the more abundant will be the comose and the retaking of the tree will be better assured.

The roots should be exposed to the air for as short a time as possible and should be particularly guarded against frost.

If, after a lengthy transport, they should have become dry, they should be allowed to steep in water for several hours, after which they should be planted immediately. The roots should not be allowed to steep too long, because, instead of reviving them, through too great an absorption of water they may become subject to mouldiness which will bring on decay, When the planting cannot be done at once, the trees must be put en jauge, sheltered from the cold and from high winds. " La mise en jauge " consists, as every one knows, in placing them in a shallow trench along side of one another ; care being taken not to mix the roots ; they are then covered with loose earth, but in sufficient quantities to enable them to stand upright , from this they are taken as required for the purposes of the plantation. When trees are received during a period of heavy frost it will not be advisable to unpack them, they should be sheltered from the cold and so allowed to remain until the weather has become mild once more.

Selection and preparation of the ground. — If one has the power of choosing his ground, a fertile soil of moderate firmness, neither too dry nor too damp, should be chosen. As a general rule fruit trees, growing from seeds require a better quality of soil than those growing from the stone. They require a richer and deeper soil. Among the latter the peach tree is perhaps an exception to this rule, although it may also be grown in light and shallow ground. The ground should be examined here and there so as to become acquainted with its composition as well as the thickness of the mould and the state of the sub-soil. A mould of about twenty five inches in thickness, is sufficient for the well being of the tree, provided that the sub-soil is loose and permeable ; where it is not so, the bed of mould should be from thirty two to thirty six inches thick. That which we now advise, is, what should be sought for, but is not absolutely indispensable.

Whatever the nature of the ground it must be prepared for the reception of trees, it must be broken up and manured, some times even it must be improved by fertilizers so as to render it more favorable to vegetation.

The breaking up of the ground, which we will not here fully describe, may be either partial or total : the latter is the better it mixes the various layers of soil which are often of different nature at different depths. When a whole square or the full length of a border is to be planted, the ground is completely broken up. A partial breaking up consists in the making of holes of various sizes.

This operation should take place at least six weeks or two months before the planting, if the ground is free, so as to submit the earth, brought to the surface, to atmospheric influences, which render it more productive. The partial settlement of the ground will take place which will permit of the leveling of the surface and of having trees. the roots of which are buried at a regular depth.

In breaking up ground, the habit of throwing into the bottom of the open trench the earth taken from the surface and of covering this with the sub-soil, is wrong. In most cases the earth of the sub-soil is barren or at least but slightly fertile. It is far removed from the quality of ploughed ground. To acquire the desired fertility it must be submitted to the influence of the atmosphere for a long period of time and must be frequently broken up. However the time of its becoming good, may be advanced by the addition of a certain quantity of half decayed manure ; but it will not be rendered sufficiently good at the time of planting unless the preparation is commenced long in advance. The roots of young trees planted in soil of that kind, develope slowly and the tree often droops during the first years after planting, from no other cause than this. This result is particularly noticeable when a piece of land is replanted after having been covered with trees for a number of years ; even although there is a change in the species of tree. The same results occur in new ground but in a lesser degree. We would therefore advise that after the trench is opened, the soil and the sub-soil should be mixed as well as possible to the depth of the digging by using a spade and a forked hoe, so as to render the mass of earth, turned up, homogeneous instead of keeping it in separate beds .and of different qualities. The well being of the tree is more certain. By sub-soil is understood the layer of ground not generally cultivated and upon which the cultivable bed rest. The mixing which we have recommended, must only be made if the soil is capable of becoming promptly fertile through cultivation. Otherwise it is better to leave it aside and to improve the ground by manures or to increase its thickness by the addition of good ground. A damp soil must be avoided and if there is nothing else to be done, recourse must be had to drainage.

Holes for planting vary according to the nature of the ground. We have seen what is necessary with reference to the depth. As for the width, in average lands, it should be at least two yards, while in good ground a width of 1.25 yard will be sufficient Besides, this varies according as the planting is of fruit trees or bushes. The earth taken from the surface should be placed apart, so as to keep it for the roots as it is of superior quality to that taken from the bottom of the hole ; the latter will in its turn remain exposed to the air and will improve in quality ; at the same time it is better to mix the whole. The bottom and sides of each hole should be broken up, as otherwise a kind of packing will be formed which will be prejudicial to the future of the tree. Fresh manure should never be put to the roots, as it is liable to cause them to rot.

It is here well to remember that when it is necessary to replace a tree, which has died either from age or accident, when no longer quite young, by another of the same kind ; to ensure success the whole of the ground taken from the hole, in which it is to be planted must be changed. The ground should be taken from a neighbouring plot, the best being chosen. Without this precaution, whether it is that the tree has exhausted the substances necessary to its nature, or whether by its excretions, it is injurious to its fellow, certain it is that the new tree will not prosper. If the tree to be planted is of a different nature from the one it replaces it will be unnecessary to change the whole of the ground, a little new earth round the roots will be sufficient together with the manuring of the earth which has been retained.

Time of planting.—In countries where the autumn is long, or where the winter does not follow the summer too rapidly, the best time to plant is early in the autumn ; but circumstances are very different in our Province and more particularly in the eastern part. Our autumn is generally so short, that it does not give time for new roots to form before the cold sets in and the tree having no hold upon the ground is liable to become displaced during the winter ; and under such circumstances runs great risk of destruction. Without any doubt spring planting offers much better chances of success.

If trees are procured in the autumn, they should be placed upon the ground, at an angle of 45 degrees and the roots and the lower part of the trunk should be covered with earth. Small roots will be formed more readily than if they were standing upright, as they will not be shaken by the wind, and these roots, if preserved with care during transplanting will aid materially in causing the tree to take more rapidly, when it is planted in the spring. There is also the further benefit of having the trees ready to hand, which will enable advantage to be taken of the first fine day to replant them. The holes may be prepared in the autumn, so as to be ready to receive the trees, but it must not be forgotten that the roots must be protected from the frost.

Before planting a tree it must be dressed. This operation is performed both on the branches and on the roots. On the roots it consists in the removal of all those which have been broken or bruised in the taking up or during their removal ; this should be done with the greatest attention and care as it often happens that the bruised roots instead of healing over, become cankered ; the tree droops and finally dies. The extremities of the dried comose and of the roots are cut with the pruning knife, so that new ones may be put forth which will greatly aid in the retaking of the tree. The cut is made underneath in such a way that the wound will rest immediately on the ground, contact with which favors the healing.

As for the branches, only broken ones should be removed and they should be pruned a short time before the rising of the sap when they should be put into proportion with the length of the roots. In high growing trees only the branches necessary for the symetrical corformation of the tree should be preserved ; the roots should be spared as much as possible.

In backward plantations it is often an advantage not to prune during the first year, only the length of the branches being regulated by their positions. As for the fruiting branches, if the tree has any, they should always be trimmed to their proper length whether the planting was done in the spring or in the autumn. (*See Pruning*).

Selection of trees. — Strong healthy trees, showing no sign of weakness, should be chosen. The younger the trees, the easier will be their transplanting and their growth the better assured It is difficult to share the opinion, sometimes heard, that a young tree taken from a nursery, where the excellence of the soil has caused it to take on a strong growth, will, when transplanted into a soil of inferior quality, have less resisting power than if it had been raised in a nursery where the soil was of about the same nature. On the contrary, experience has proved that such a tree will combat with greater advantage the poor quality of the new ground, than another weaker tree, coming from a nursery in which the soil is only of an average quality.

The roots of well growing trees are more absorbent, their sap channels are more open and their wood fibres better put together than those of weaker although healthy trees ; they have greater power of resistance. Therefore our advice is that trees should be taken only from nurseries where the fertility of the soil has made them strong in a climate as similar as possible to that in which the plantation is to be made.

Planting.—When the tree is prepared the planting has to be considered. One of the first precautions to take, is to get the necessary depth, which varies according to the nature of the soil and of the subject upon which ihe variety is grafted. In a warm light soil it will be better to dig deeper than in a soil which is damp and cold, in which it will be necessary to keep the roots as near as possible to the surface, so as to prevent them from rotting and to forward their vegetation. Il must always be so arranged that the air may reach the roots, consequently they must not be too much covered up. The tree will be more fertile and the fruit of superior quality.

If the effects of cold or more particularly of drought are to be feared, it will be well to cover the soil with a layer of half decomposed manure in the shape of top dressing during the first and second years of the plantation. The roots in ground protected in that way, will be assisted in their early development. In planting, the effect of the packing of earth freshly broken up or loosened must be taken into consideration To place the tree at its proper height, a long rule placed across the hole, may be employed; the roots are placed in the hole and the trunk is put down along the rule at a deph of 25 inches. The tree is held in position and the hole is filled in the following manner; earth is thrown in when the tree is at the required height. If decomposed turf is to be had, some is put into the bottom, being first cut up with a spade so as to avoid too close settling. A man then holds the tree in position, taking care that it is in proper line with its neighbours, if necessary another man then packs the earth between the roots. These should all pass through the hands of the planter, who gives them their natural direction without bending or forcing while he is covering them with earth If there is a tap root which cannot be placed in a vertical position it should be inclined horizontally to one side. Care should be taken to avoid shaking, as is frequently done with the object, it is claimed of causing the earth to fall in between the roots: this custom of shaking the tree, by lifting it slightly, deranges, the roots, causes them to gather together while they should be spread apart and often causes the breaking of some of them.

There should be no stamping round the foot of a tree after planting ; this is a bad practice, because in stamping the ground, the roots are liable to be broken or at least to be bruised. It must be simply supported at the foot to hold it up against the wind. The rain will settle or pack the ground. In a very backward plantation, wetting the roots to assist the immediate adhesion of the earth will be advantageous and two or three cans of water poured slowly around the foot of the tree will materially aid in packing the soil.

When the transplanting of a tree, covered with leaves, is necessary, the removal of the latter is indispensible, while at the same time the petiole or leaf-stalk must be carefully preserved as it is intended as a protection to the eyes and buds. The green ends of the shoots should also be cut off, so as to prevent the evaporation of the sap and the consequent drying up of the boughs and branches. Watering the trunk and the branches as well as the roots, will facilitate the retaking of the tree, which is always a doubtful operation. It is always better to plant in fine rather than in rainy weather ; sound healthy ground is better than ground containing too much moisture, as the latter will settle, become packed and injure the developement of the young root fibres.

In the spring when planting is over, unless the soil be very damp, a light covering of straw about the roots will keep them cool ; a little digging and some watering during the summer, if necessary, will complete the required care.

It is a matter of importance to observe the proper distances between the various species of trees, as it is one on which the succesful results of a plantation often depend.

This question will be treated separately in connection with each species of fruit tree, as the laying dow[illegible] general rules is impossible, as the distances vary according to the nature of the trees and also according to the way in which they are raised.

Staking.— Young trees should be supported by stakes, so as to prevent them from being too much shaken by the winds, which would loosen the roots, injure their adherence to the soil and so prevent the retaking of the tree. The stake, a little longer than the young tree, should be fixed in the ground at the same time as the tree itself; by driving it in afterwards, there is the risk of striking and injuring the roots.

Animals of all kinds should be kept from approaching the plantations. Not only will they eat the young shoots, but by rubbing against them, they loosen the trees, even when they do not actually tear off the bark.

PRUNING

Advantages of pruning.

The purposes of pruning, in the general acceptation of the word, are the following :

1° To give to the trees a regular shape and to preserve the same through the equal distribution of the sap to their various parts.

2o To render fruitful those which are not so naturally.

3o To keep them in good producing condition.

4o To obtain larger fruit, of better quality and of earlier production.

5o And often to prolong their existence.

Fruit trees, cultivated in gardens, should be given regular shapes, so as to permit of their being easily trained in desired directions. The limited space, often allotted to their cultivation, necessitates their pruning, so that they may not take up too much space, while at the same time yielding an abundance of fruit.

There are some trees, which left to themselves, will scarcely fruit at all. By pruning there are means, of which we will speak later on, of hastening and increasing fructification.

Their returns are also more certain and regular ; by only allowing a certain quantity of fruit to remain on the tree every year the exhaustion of the tree is prevented.

The fruit allowed to remain on the tree in quantities proportionate to its strength and receiving each its suitable share of the influence of sun and air, will become larger and of superior quality.

Pruning is therefore valuable, but only on condition that it is operated according to true principles of vegetable physiology. Improperly carried on, it not only injures the production but may affect the very life of the tree; well done, it keeps the tree in a good state of health and production; it even prolongs its existence by preventing exhaustion and by ridding it of any diseases which may arise.

The principles of pruning.

The following is a short summary of the principles, of which the arboriculturist should never lose sight in the cultivation of fruit trees or in the use of the pruning hook.

Every error in vegetation, tending to interrupt the harmony and equilibrium which should exist between each part of the tree, cannot be otherwise than hurtful to its growth and fruitfulness ; to remedy any such the following principles should not be departed from :

1° *Only trees in a perfect state of vegetation give regular and perfect fructification.*—Trees in which vegetation and fructification are not balanced, those which have fruited too soon, those which have grown too rapidly, or again those of stunted or reduced growth will never have a perfect and lasting fructification.

2° *To remain healthy and productive, every portion of the tree should receive an adequate quantity of sap, light and heat.*—Arrange things in such a manner, that there will not be a single leaf, bud or branch in your garden, which shall not receive perfect light and air, and you will be assured of handsome crops. By following this rule, your trees almost worthless, through mis-management, may be made to become productive.

3° *The tree must always be kept below its vegetative power*, that is to say kept up in its growth ; remembering the law of vegetation that requires that a tree, like every other creature, shall increase with age and become perfect, that is it shall be formed of a stem and lateral branches and not of a stem alone without branches, it should not be crooked, sloping or badly formed in any other way.

4° *A balance should be maintained between the growth of the wood and the fructification of the tree.*—If the growth of wood exceeds, the tree remains sterile ; if it fruits too soon or in excess it promptly goes to decay.

5° *Each tree should be preserved in the shape that is natural to it and adapted to its species.* — Pruning should only be done to regulate this shape, and not to make a pear tree like a bowl, or an apricot like a pyramid.

6° *Every tree in a perfect state of vegetation forms straight branches, well balanced between themselves, which have a tendency to separate without crossing one another.*— It is only through some accident that branches become defective. All crooked or elbowed branches should therefore be removed.

7° The size and strength of the frame should be in keeping with the age and vigour of the tree and of the products to be obtained from it.

8° *All the branches and fruit branches of the same age and nature should be equal in strength, length, direction* *and fertility.*—A tree which shows strong branches on one side and weak ones on the other, at unequal distances in its circumference, can not be a long living tree or regularly productive.

9° *The older branches should be longer and stronger that those which are younger.*

10° *New branches should only grow from the trunk of the tree and above the older branches or by the bifurcation or forking of the latter.* — Except to fill a blank space or to replace a branch, new branches should not be formed below the frame of the tree.

11° *Each part of the tree, having a particular destination either for the formation of a branch or fruit branch, should be properly situated.*

12° The fruit branches, lasting only a limited time and all branches becoming thinner after the sixth year, they should be preserved or replaced by pruning.

13° *As vegetation only developes on the well formed eyes of the wood of one year, it is on these eyes that pruning should be operated;* except in cases where it is impossible to do otherwise than work on the old wood. These principles include the whole art of pruning.

Time for pruning. — The proper time for pruning has always been a disputed point, and if some maintain that pruning may be done as well in the autumn as in the spring there are other who as firmly maintain that the spring is the best time.

It is a certain thing that, in our rigorous climate, when the pruning is done in the autumn, when the sap is no longer rising, a scar will be left which the cold will prevent from rapidly healing over. We therefore consider it better that the pruning should be done in the spring, before the rising of the sap, so as to avoid its loss and the weakening of the tree. It is astonishing to note the rapidity with which the bark covers the wounds made at this season of the year. In this case the tree does not lose a part of its sap in the branches previously removed, but on the contrary uses it to heal the wounds and to give to the remaining branches a better growth and greater vitality. Pruning in the summer, when the sap is in full operation, has also been spoken of, but it is absolutely sure that by doing so the growth of the tree is stopped. However in the case of a barren tree recourse may be had to pruning at this season to induce the emission of buds. This is the opinion of Mr. Moore who declares that this is the only case in which summer-pruning is to be recommended. Experience has demonstrated that in our climate, the commencement of April is the best time for pruning in the West and the end of the same month in the Eastern parts of our Province.

Instruments used in pruning.

The Pruning-Knife.—This is the most ancient and the best instrument used in the operation of pruning. It cuts clean and the wound heals perfectly ; and further by it alone can a complete and safe pruning be effected. It is not an uncommon thing to meet with cankered spots upon the branches or trunks of trees, the commencement of decay, which will end by the loss of the branch, but the removal of the affected portion of the bark will stop the advance of the evil. If the gardener prunes with pruning shears he neglects the suppression of the evil and the finest plantations are ruined by this neglect The most beautiful plantations of pyramids have been destroyed from the effect of a worm the the stems of these trees were affected with long narrow cankers, the simple removal of which with the pruning-knife would have arrested them on their first appearance; the gardener using the pruning shears does not concern himself with the cares of preservation. The great merit which the instrument has in his eyes is, that it can be used quickly and with vigour, a proceeding which certainly permits of pruning without reason, it being sufficiently hard for the necessary attention to keep pace with the action of the pruning-knife. Nursery-men avoid using it. The introduction of the pruning shears has been a powerful cause of ruin in our gardens. The pruning shears wound, the pruning-knife heals. One half of our pyramids were pruned with pruning shears, the other half with a pruning-knife; the difference at the time of the starting of the shoots was so plainly visible, as to be remarked by persons entire strangers to arboriculture.

A pruning-knife should be procured from the manufacturer of special tools for gardening. A turned box wood handle will not fatigue the hand and will allow of its being turned in every direction; the crook should be moderate; those with too slight a curvature, and those with the heavy curvature of the old fashioned pruning-knife should be refused. Pruning-knives obtained from hardware merchants are rarely well tempered and are liable to become notched.

In using the pruning knife, the left hand is held lower down, out of danger, the branch is held by placing the thumb under the eye above which the cut is to be made, the cut should not be made towards the operator, but away from him, making a clean cut outward and sideways, commencing the cut with the end of the blade nearest the handle.

If the branch to be removed be a strong one, it is ben down with the left hand, then at three or four inches from the stem it is severed by a cut lengthways, the stub of the branch may be removed afterwards. By care in making the cut a long one, large branches may be removed by a single cut of the pruning-knife.

If in removing a branch, there is danger by the same cut, of injuring another which should be preserved, an accident which might happen to the most expert, a wise precaution is to cut the branch off in pieces by several clean cuts, having full control of the knife.

To sharpen a pruning-knife, the blade should be placed flat on the corner of a table or on the top of a picket, when the whet stone is rubbed flatly over it, as if the sharpening was only being done across the blade, care being taken not to allow the stone to act lengthways on the blade, so as not to injure the thread of the steel. The best stone to use is the black stone of Angers, which is used in the nurseries at Orleans. It puts a fine edge on the best tempered steel, the oil stone is good, but too smooth, the other kinds give a rough edge

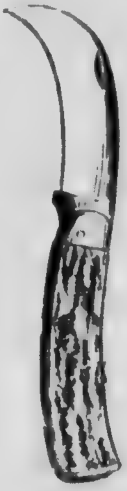

Fig. 1. Knife with a stag horn handle.

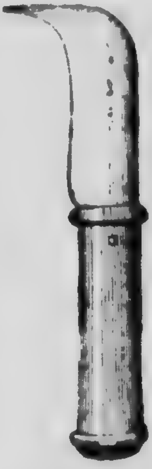

Fig. 1 *bis*. Wooden. handle.

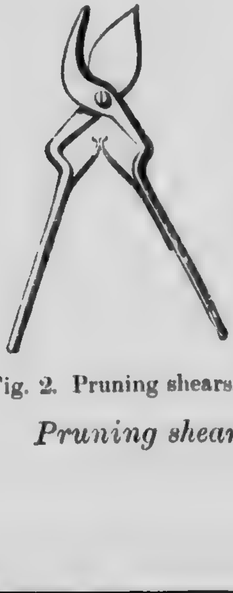

Fig. 2. Pruning shears.

In the pruning-knife with a stag horn handle (fig. 1.) the curve of the blade is not sufficiently pronounced we prefer the one with a wooden handle (fig. 1 *bis*) which shows a perfect curve.

Pruning shears are suitable for the vine, the peach tree, the gooseberry bush and the rose, but should not be used on the terminal branches of the frame of the peach tree. As they cut by crushing, the wood is always destroyed for a certain length, the wounds made by the pruning are black and disorganized, the difficulty in keeping the blade sharp, causing it to act more by pressure, especially when the instrument is not new (fig 2),

Pruning shears are used with the blade underneath and this is only sharpened on one side.

The hand saw.—The hand saw (Fig. 3) is used for cutting off the thick branches, it is double toothed and the blade is thinned off at the back to enable it to pass freely through the wood. The cut however should be made smooth with the pruning knife, for every cut made with the

Fig. 3.—The hand saw.

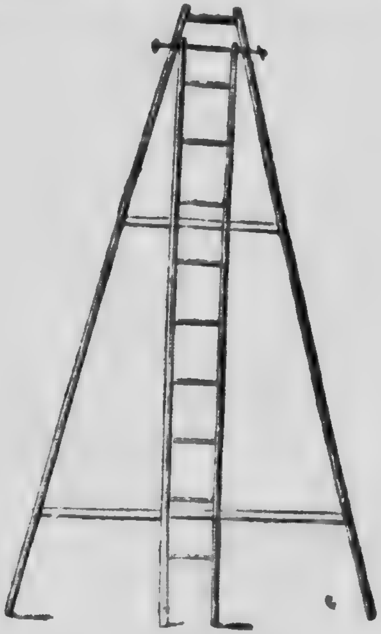
Fig. 4.—The ladder.

saw, rots and dries up for a certain length. If there are a certain number of branches to be removed, the quickest way is to cut them off with ihe pruning knife about three inches from the trunk, later on in the month of september the stubs may be removed with a carpenter's chisel close to the trun without leaving the least excrescence.

The Ladder.—(Fig. 4) shows the model of a light and portable double ladder, which stands perfectly between the the branches of the tree and enables the higher branches to be reached.

The cutting off of small branches.—Generally the cut is made too close to the eye, and there is danger of causing it to wither. The pruning of the branches of hardwood fruit trees must be done in such a way that the base of the cut shall start at the level of the end of the eye and on the opposite side of the branch or a little under this level (fig. 5). By this course the cut is removed far enough from the eye, to leave a sufficient length of wood above to dry up without killing it. Furthermore if the cut is made too close to the eye, its base would no longer present a sufficiently large surface to support the foot of the branch which will grow from it. The cut must be neither too flat nor too sloping. but should be an oblique cut, permitting the branch to easily recover from the wound. A cut which is too flat will cause the branch to elbow, the wound will heal with difficulty and will form a dry knot. Too long a cut presents too large a surface and is liable to cause the withering of the eye.

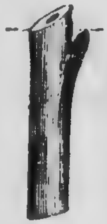

Fig. 5.
CUT OF A BRANCH.

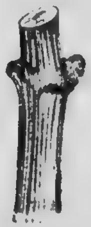

Fig. 6.
CUT OF AN EYE.

The examination of the tree before pruning.

Before reviewing the various operations included in pruning it is well to be acquainted with the different parts of the tree, starting from the stem. It is absolutely necessary to thoroughly distinguish the various phenomena which are produced in the upper part of the tree before undertaking intelligently the operation of pruning.

The Stem. — The trunk or stem is the name given to that part of the tree which occupies the centre, it starts from the neck of the root, rises perpendicularly and terminates in a branch called a head. The stem gives birth to lateral branches and serves to carry the sap intended for their nourishment. Its height should be in proportion to the strength of the tree.

The lateral branches should be properly spaced and should, as far as possible, succeed each other. They will be closer together on the stem near its base. By this means the sap will be better distributed. The growing of many at the same point must be avoided ; they would weaken the part of the stem above them by cutting off too large a quantity of sap. It would be very troublesome to reestablish the balance.

Small branches terminate the lateral branches ; they result from the shoots of the previous year and they form and continue the branches. When the growth of the tree is regular, it is upon these small branches that the operation of pruning takes place.

False or *premature branches* are the produce of eyes which have developed during the year of their formation; they therefore always start from the lateral branches. They may be brought out by pinching or may develope naturally.

The large and the false branches are furnished with eyes both on their surfaces and at their extremities.

The eye. — The eye is the bud in its rudimentary stage it is the element of all production. It is found on all trees and on all their parts in different stages; according to species it may exist for a long time without showing itself, or it may develope at once. The bud is destined to produce wood or fruit according to circumstances and sometimes the two at the same time.

The eye is of two forms, it is conical when it terminates the branch, it then takes the name of terminal; flat wh[illegible] it is found on the surface or circumference in which ca[illegible] called lateral. The lateral eyes are flatter, the further, [illegible]y are from the top of the bough, at the base of each eye and of each small branch, there are two supplementary eyes, very small and situated one on each side, generally developing when an accident has happened to the principal eye or that the latter is a malformation; the buds from these eyes are less vigorous than those produced by the principal eye.

Eyes hold four positions which it is useful to know: in front or behind, according as they face the observer or otherwise; above or below according to their positions on the branch. Each has its advantages and its disadvantages which will be known after pruning has taken place.

When the branch has been pruned, the eye which has become terminal takes the name of the eye of the pruning.

Latent eyes. — These eyes, scarcely visible are only found on old wood : they sometimes remain inactive for several years and only develope in consequence of a pruning made above them : a change in the direction of the sap, or the weakening in the extremity of a branch may also cause their developement.

Other eyes are also found on old wood, near knots and elbows ; they are never visible, and develope often spontaneously or in consequence of a short pruning.

These two sorts of eyes are of the greatest utility in the success of certain operations.

The space between two eyes on a branch is called the internode.

The glutton. — This is a branch, which has taken on a growth disproportioned to that of neighbouring branches. It is known by its size : the eyes near its base are very small and at a distance from one another ; those on the upper part, on the contrary are large and often develope into false branches. The glutton grows on the stem, above the branches, near the elbows, where the circulation of the sap is lessened and presents a fairly strong foot hold from its earliest growth. In consequence of this position it has a tendency to obtain strength to the prejudice of the other branches and to destroy the balance in the tree. These troubles which the glutton may cause are warded off by pinching which it is sometimes necessary to repeat so as to overcome its strength. Trees well looked after should not show any of these branches, but still it is sometimes important to cause their growth, to utilize them in remaking the frame of a tree, in part exhausted. When we treat of the restoration of old trees, we will revert to this subject. This condition is more common in the peach than in other trees.

The *Wattle* (fig. 7) is a long, slender and flexible branch from 32 to 36 inches in length, the eyes upon which are small. It is found on all parts of the branches ; it does not grow strongly and is one of the first places where fruiting takes place : they should therefore be preserved in young and vigorous trees, until such time as the production becomes abundant. It is easily caused to fruit by bending it and destroying the terminal eye. If the latter is a fruit eye, it should be kept and the branch should not be bent. On fertile trees it is not necessary to allow it to remain, unless it is in a blank space, in such case it should be pruned so as to form a fruit branch.

The Twig (fig. 8). — The twig is a little branch from 1 to 2 inches in length placed at a right angle generally on the upper side of the branches, terminated by a conical eye, but which becomes round and assumes the character of a fruit bud. It seldom attains to any considerable size therefore it is not pruned. It often takes several years to yield fruit. The first year it is only a slightly elongated eye, which instead of becoming a shoot remains stationary accompanied by three leaves. The second year, the eye having become larger and rounder than an ordinary wood bud, becomes longer and wrinkled round, and is accompanied by four or five leaves.

Fig. 7.

During the following years the little twig continues to grow slightly bigger and the eye changes into a shoot in the middle of a bunch of five or six leaves. It is one of the principal organs of fructification. It is therefore not removed, unless there are several near the same spot. Besides there are not many on young trees. Sometimes on very fertile trees, the little twig gives fruit in the first year of its appearance.

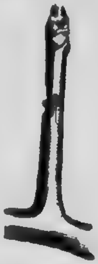

Fig. 8.

The bud. — The bud incloses the flower and from it the fruit is produced. In the same species of tree, it is larger and rounder than the eye and commences to grow at the same time.

In trees, the fruit of which have seeds, the buds are found on the old wood, at least as a general rule; they only appear on the young wood when the tree is particularly fruitful.

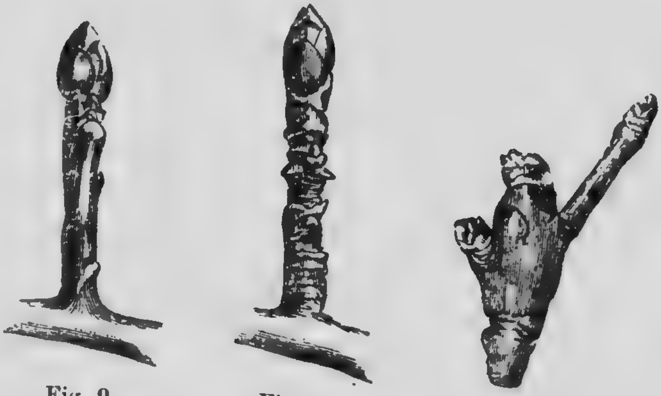

Fig. 9. Fig. 10. Fig. 11.

Organs of fructification

The point where the fruit or the flowers were attached is small, round, tender and truncated in its upper parts, having many eyes round it which will eventually change into buds. It is found principally on the fruit branches : It is an essentially fertile and fruit bearing organ, although it may be made to produce wood, if necessary. (Fig. 9, 10 et 11).

The *fruit branch.*—(fig. 12). In the pear tree, the fruit branch is generally several years old ; it should be kept as short as possible ; still there are some species in which its length varies from about 25 to 30 inches. It is characterized by being furnished with fruit buds, twigs and sometimes with small branches. A branch of this kind which has once given fruit will always give it unless prevented by accidents of the season. It should be prevented from producing too abundantly, otherwise it will very soon become exhausted.

Lastly the *small fruit branch* (fig. 13) shown above, although it rarely actually produces fruit, as it has to be pruned down, is only met with in trees of great fertility or drooping on account of transplanting, accident or exhaustion of the soil, at the ends of the lateral branches well provided with fruit branches. It is therefore not improper to cause their removal.

Pruning Operations.

The *Cut* —(fig. 14) consists in removing the whole or part of the branches to be pruned. There is a correct way of doing this. In hard wood the cut must always be made from three to four inches above the eye, according to the size of the branch, and in soft wood from five to six inches. The face of the cut must be opposite to the eye, so as to allow the water or sap to run without injuring it, it must be cut with a rounded bevel so as to present the smallest possible surface.

Fig. 14.

The branch should be held with one hand with the thumb underneath the eye to be pruned and the pruning hook drawn obliquely across it with the other hand so as make a clean cut. The operator should have complete control of his instrument so as to avoid cutting himself or injuring the neighbouring branches. The part left between the eye and the cut is called the aiglet

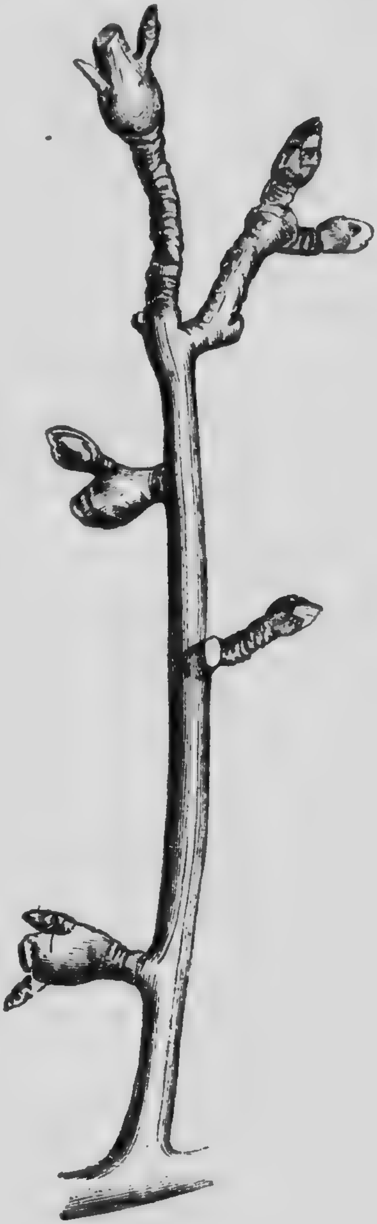

Fig. 12.
Fruit branch.

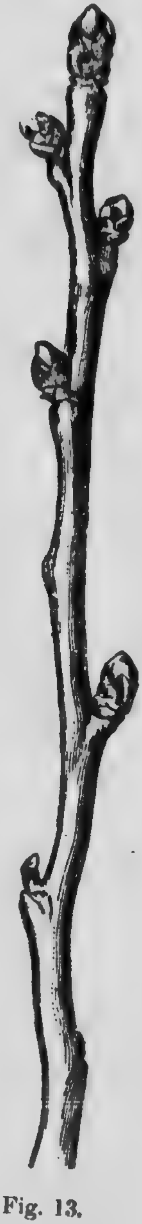

Fig. 13.
Small fruit branch.

Length of the cut.

The effect of pruning on a branch. — An unpruned branch has not sufficient strength to enable the eyes along its whole length to grow as they should. Only the end of the branch grows in a weak way and the eyes on about one third of its lower part do not develope and remain latent; such a branch is weak and shows bare places about its lower part (fig. 15). Fig. 16 shows the result of not pruning a branch. It has a weak growth and is bare in places. This has reference to the small branches on the lateral branches of a pruned tree.

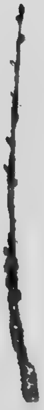

Fig. 15.

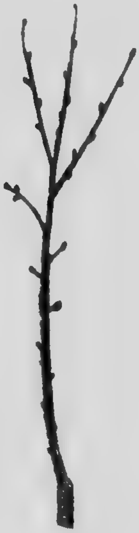

Fig. 16.

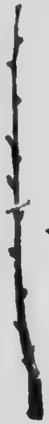

Fig. 17.

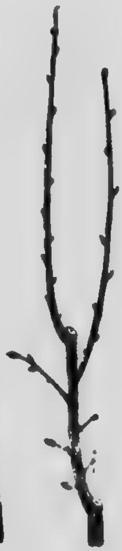

Fig. 18.

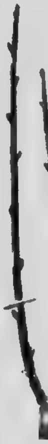

Fig. 19.

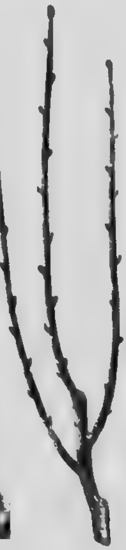

Fig. 20.

The branch which forms the frame of a lofty tree may attain a strong growth without the help of the pruning hook.

An average pruning. — In an average pruning the sap which is turned backward is in sufficient quantities to cause the parts which are left to acquire a healthy growth. It causes the development of all the eyes on the branch, both those producing wood and those producing fruit and these strong and proper productions form a strong and fertile branch, perfectly furnished with good fruit branches along its whole length. An average pruning gives vigour and fertility ; (fig 17), a bough pruned of a third or half ; fig. 18 shows the result of the pruning off of a half.

Short pruning.— If a large part about three quarters of a strong growing branch is cut off; the sap, forcibly driven back upon the few eyes which are left, causes them strongly to develope wood branches with only a slight fruit production, so that by cutting very short, wood is produced but no fruit, (fig. 19). A branch pruned short ; (fig. 20) a branch the result of short pruning). Short pruning is an excellent way of obtaining branches, where they are needed. In cutting a branch short, the terminal eye and the two below it generally give strong branches. By pruning, a branch is obtained where it is wanted, since by pruning at an eye above the one which is to produce this branch, it is obtained by the bifurcation of the stem.

It will be remarked that to obtain good results from pruning, the length must be taken into consideration : it would be bad to prune the tree systematically short or long each year, it would be ruined instead of being assisted in its growth. The length of the pruning should be according to the species and to the strength of the particular tree operated upon. The following are some general rules, which without being absolute, may serve as guides. The pear tree and the plum tree are pruned from one third to one half.

The peach and the cherry tree from a half to three quarters.

The apple tree from a quarter to a third.

The vine on the two first good eyes. The length should always be nearer the first that the second suggested. These average lengths will not be always followed in practice, but by taking them as a guide, the pruning will not be far wrong, neither too short nor too long. Further there are many cases where the above rules will not be followed: for instance when it is desired to concentrate the sap on the terminal eye and not to lengthen the branch the pruning will be shorter. If the branch is weak and if it is but slightly longer than a pruned branch would have been if strong and healthy, it is pruned very long, cutting off however one or two of the terminal eyes which are likely to produce fruit.

In glancing over certain books on arboriculture, we read in one place " Prune short to obtain a vigorous growth " and further on " Prune short to weaken," or again " Prune long to obtain strength " or " Prune long to weaken " How explain these contradictions. The curious part is that the author is sometimes right, but has not given the reasons for these obscure recommendations, which we will now endeavour to explain.

Vigour is given to a branch by pruning long, if the other branches are pruned short, the long dominating.

A branch is weakened by pruning long if the other branches are pruned long, the sap being less concentrated.

Vigour is given to a branch by pruning short, if the other branches are pruned equally short, the sap being concentrated.

A branch is weakened by pruning short if the other branches are pruned long, the latter dominating, being more favored by the sap.

From these latter observations certain rules result which we will now explain.

Prune two branches of equal strength, the same length, if you wish to keep them equal.

Prune strong branches shorter and weak ones longer, if you desire them to become equal.

A reduction of 1 to 2 inches is sufficient to bring the two branches to an equal length in one or two years growth.

If it is desired to bring on a particular stem or branch, prune long, so as to dominate the other branches.

If a branch is not pruned at all or is pruned too long, the sap will abandon the lower part and the branch will become bare at its base. Too long or too short prunings are sources of weakness, especially if done the same from year to year.

The removal of strong branches should only take place under absolute necessity, since the frame of the tree once formed should last as long as the tree itself. If a tree is badly formed, the form must be remedied, while at the same time preserving its frame.

To divide a stem or branch, the two shoots growing from the terminal eyes are utilized. But sometimes it occurs that in young trees either standard or dwarf, divided in a V, several small branches have sprouted from the shoot growing from the graft, one terminal and two lateral ; it will often be better to make the fork, by removing the terminal branch, although it may be the strongest, at the two lateral branches, which are of equal strength and better adapted for the division of the stem (fig. 21).

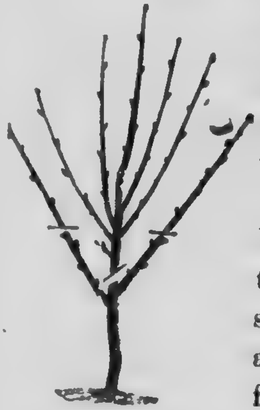

Fig. 21.

Pruning at two good eyes. — The two eyes at the extremity of a branch, whether pruned long or short, develope with greater strength and equality, than the others ; two strong shoots sprout from them, generally of equal strength, and these form the fork. The other small branches, which are below have less strength and if they ever become branches, are more often only secondary, while the two branches produced by the two terminal eyes, become the parent branches, strong and lasting.

In pruning, these two terminal branches are the best for forming the frame of the tree, for it is with great difficulty that sufficient strength can be given to a third branch to enable it to become the equal in strength and durability of the two branches at the fork. In certain species, the vine, for exemple, it is only on these two terminal eyes that reliance can be placed for obtaining strong flourishing shoots ; the other eyes either do not develope at all or else give shoots of unequal strength. The strength of the second branch, generally equaling that of the first, is sometimes a disadvantage, if the branch is not to be divided and often the branch, following the stem, instead of forming a lateral branch, has a tendency to form a second stem with as much strength as the first.

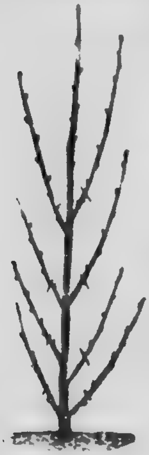

Fig. 22.
Pruning at a fork.

The second small branch on a branch, after the terminal, is so strong that it is difficult by pruning to cause it to become fruit bearing, therefore it should be removed at its base.

Pruning at a fork.—The fact that the two terminal eyes grow vigorously and equally, explains this way of pruning (fig. 22.) followed principally in nurseries, for the formation of stems. To grow them strong and long, the lateral branches must not interfere with the stem, especially if the first branch next to the stem is as strong as the stem itself ; but these shoots being necessary to the growth of the tree, cannot be cut off they must be cut very short, leaving the stem entire which will cause the sap to run to it. This method of pruning is called "*à crochet*" after the spouts with which the milk cans are emptied in Normandy.

A branch has grown out and become longer than the others; it is cankered, badly formed or ruined, or there are too many branches. The cutting down of the old wood would be injurious, the strong stub would dry up; in such a case pruning on a fork should be resorted to; that is to say it should be cut down to a secondary lateral branch, which becoming the continuation of the branch shortens it, equalizes it with its neighbours and forms a new extremity without causing its removal to be noticed (fig. 23).

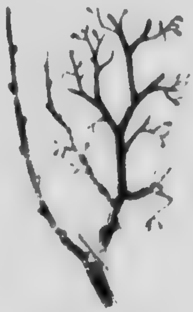
Fig. 23.
Pruning at a fork.

This kind of pruning is generally done on standard trees, well grown up and the tops of which are too broad and upon younger branches. The strong overgrown shoots or the ruined portions are cut down to a weaker lateral branch, weaker but still healthy. By this means the tree is given a well rounded head, without making it possible to notice that the top of the tree has been reduced by pruning.

Pruning at the base.—This is the complete removal of a branch at its base. It should only be done in cases of absolute necessity, either when there are too many branches, two branches starting from the same base or a branch too weak or ruined.

When in a standard tree a lateral branch should not be higher than the top of the tree, it should be reduced by a third or a half, if its complete removal would make the stem of the tree too bare.

The removal of a large branch is injurious when its base is larger than one fourth of the diameter of the stem: it is better to weaken such branch by reducing its length, cutting it off altogether later on, when the tree has attained a stronger growth.

When three branches start from the same point in a standard tree, the middle branch, choked by the other two, leans against them and only holds to the tree by a contracted point at its base : this branch should be removed as it will not last and will never be the equal of the others.

Operations which assist the growth of the valuable parts of the tree.

Removal by Cutting off.—The cutting off of ruined parts or of parts not required, assures the growth of the parts which are left.

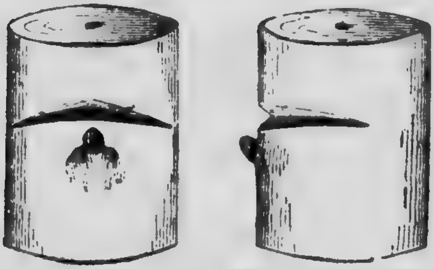

Fig. 24.

The notch.—If the sap which is circulating through the stem or the branches of a tree is intercepted by a lateral cut or notch (fig. 24) it is arrested in its ascent and is turned to the eyes or branches underneath and near the incision and causes them to grow vigorously (1). Fig. 24 shows the stem of a young pear tree, on which a branch is missing, an eye is found in the place where this branch should have been and the notch causes this eye to sprout into a small branch.

If instead of a branch there is a fruit producer, it should be removed at its base and a notch is made to cause the sprouting of the supplementary eyes which are found on this base. It is also made above a weakened branch.

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(1) The notch, described by the ancients, was first recommended in 1818 by Sageret, a distinguished physiologist.

The notch is made by the removal of a portion of the bark and wood above the eye from about one third the circumference of the branch. It must be made with the pruning hook, never with a saw which will cause the formation of a canker. This notch must be neither too wide nor too deep and above all it must not be made in the shape of a horse-shoe, as it would then become a means of weakening the eye instead of giving it strength, the sap spreading at the base of the notch, to resume its circulation in the stem, will fail to assist the eye which would then be higher up than the base of the notch.

The notch is an excellent operation which assists in the creation of new branches in bare places on the stem even when old. By this process branches are produced where needed or weak branches are strengthened. It may be carried out on seed trees but is injurious to nut bearers, as gum forms on the notch. In the latter case the wound is covered with grafting wax. Still in peach trees, fruit branches pruned long are sometimes notched, when the blossoms are too far off. This kind of notching which is done by a simple slanting cut of of the pruning hook, half through the wood of the branch, does little harm and assures the sprouting of new shoots.

Notching however must not be overdone, it must only be done when there is an absolute necessity for it, as every wound is an injury to the tree ; not more than three or four at the same time must ever be made on a tree. Further it should only be done on the stem as when made on the length of a fruit branch it forms patches which are injurious to the tree.

Notching young wood is seldom, an advantage, the eyes having full disposition to develope. If the operation should become necessary, it must be done by a simple transverse cut, on account of the weakness of the young stem.

The vertical incision.—We cannot recommend the operation, which however, it is true has the effect of assisting the enlargement of the tree, by relieving the contraction of the bark. It has the great disadvantage of loosening and puffing out the bark in places and, in consequence, forming cankers and dried up places ; other means should be adopted to assure the growth of a tree with smooth bark as the smooth bark must be protected, but in parts where the bark is rough, barking is preferable.

Barking. — From the rough bark, chips are cut off, without going as deep as the sap wood ; the part from which the bark has been removed expands ; a new greenish bark is formed underneath and the tree is to a certain extent rejuvinated.

The barking should not be done too thoroughly, a strip of bark removed here and there from the two sides will be quite sufficient.

Its results are marvellous on trees which have been frozen or those attacked by fire or by kermes.

Operations for the preservation of the valuable parts.

The removal. — The removal of the worthless has naturally the effect of preserving the valuable parts since in cutting off those which are useless, the valuable parts receive the necessary quantity of sap, of heat and of light.

Pinching.—Pinching is an operation which consists in the removal with the nail or pruning hook of the extremity of a growing shoot, with the the object of arresting its growth. As this shoot only lengthens from its extremity, its growth ceases at once when this extremity is cut off and vegetation only recommences when the two lateral eyes of the shoot begin to sprout.

Pinching weakens the shoot by arresting its growth for a certain time, but this operation is a regular bleeding which should be done with the greatest care and only when absolutely necessary. Should this method of weakening be overdone the tree will be sure to suffer.

Pinching is employed : 1° to equalize the branches by preventing one from overgrowing the rest ; to effect this, the vegetation of the too vigorous branch, which tends to destroy the equilibrium of the tree, is arrested by pinching (fig. 25). The extremity of this branch is pinched and the others, which continue to grow, soon catch up to it and the equilibrium is reestablished.

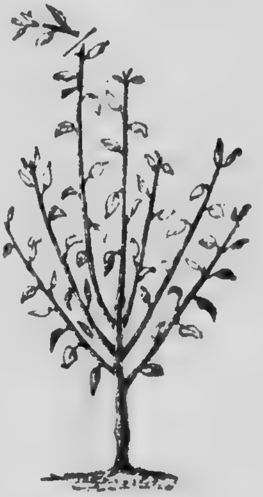

Fig. 25.
Pinching of a vigorous branch.

The pinching must only be done if the shoot has attained a sufficient length, so as not to weaken it too much ; and further only the smallest possible portion must be taken off. It is not necessary to cut off a long piece of the shoot so as to bring it down to the length of the others, as the latter continuing to grow would become too much longer and the equilibrium would be destroyed on the other side. It must not be forgotten that large cuttings are injurious, they throw the sap back upon the fruit branches and cause them to produce wood.

2° Pinching is also useful in preventing a too strong growing fruit branch from being transformed into a wood branch which would be useless and out of place. Some fruit branches, those especially on the upper part of a branch, become too strong and have a tendency to become wood branches: by pinching them their vegetation is arrested and they remain fruit branches (fig. 26).

Pinching assists particularly in maintaining the equilibrium of the frame of the tree by arresting the overgrowth of certain branches; but as the true principles of cultivation require that every part of the tree should be healthy, pinching should not be overdone as it would have the effect of a general weakening of the tree, of the growth of premature and bad shoots and of the turning of fruit buds into wood.

Of late pinching has been carried on to such an extent that it has become a real cause of decay. The fact has been forgotten that a tree will not grow and become strong unless its branches are terminated by many small branches in a complete state of development and not by one only. The end of June is the time when the surplus branches may be removed, but then they have finished their work, they have caused the branches to grow large and the roots to develope in strength equivalent to the developement of these branches.

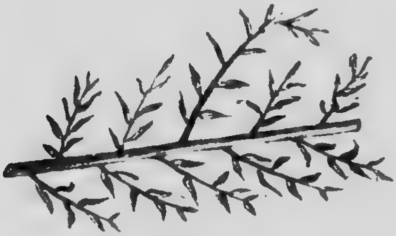

Fig. 26.
Pinching of a too vigorous branch.

Direction.—The branches of a tree naturally take a direction which varies according to the species and variety, this natural direction should be preserved: thus an English cherry tree, the branches of which are vertical, would suffer if they were given a horizontal direction.

The upward direction of a branch has a great influence upon its growth and fructification.

1° *Vertical branches* (fig 27).—The sap seeks the vertical branches by preference, it then abandons the lower and sloping branches. These branches then grow vigorously but the sap circulating too rapidly, the fruit branches do not develope properly for fruit bearing and often remain sterile. Still certain varieties, with heavy wood and fruit and moderate vegetation. The Valencia pear varieties which have a strong tendency to exhaustion, are found with branches of a very upright direction, but never perfectly vertical, a slight incline being sufficient to support the lower fruit branches.

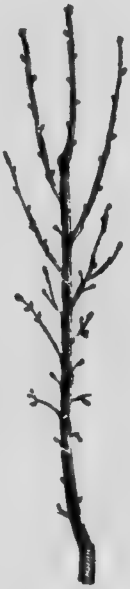

Fig. 27.
Vertical branch.

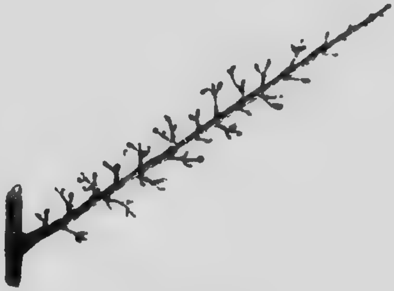

Fig. 28.
Oblique branch.

2° *Oblique, sloping branches* (fig. 28)—This is the most natural and correct direction, it gives perfect fructification, and has a moderate vegetation, besides it is the direction which branches take while fruiting. The older a branch becomes, the more it slopes but once completely formed it is kept at the desired incline. A young branch while forming will first be upright and will then incline by degrees. If, at once forced into the inclined position, which it would attain later on, it would be weakened and could not grow properly.

3° *Horizontal branches* (fig. 29).—This is an unnatural direction.

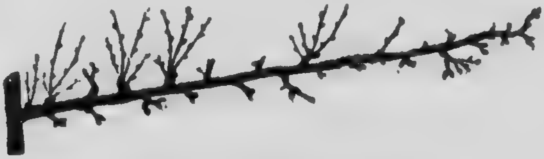

Fig. 29.—Horizontal branch.

It is true that in some trees in an orchard, horizontal branches are seen among the most productive, but these branches are resting after long fruiting. After having grown vigorously in their youth, gradually bent down under the weight of their fruit.

A young branch forced at once into this position hardly grows any more, fruits at its extremity, does not become longer and ends by drying up ; if it vegetates it does not become bigger but continues to weaken after a short fructification which has helped to bring on its exhaustion (fig. 29).

If a strong branch is forced into a horizontal position, the sap, refusing to circulate never reaches its extremity which developes weak fruit branches and then dries up. Further than this the fruit branches underneath, receiving no sap, dry up and die and the under part of the branch becomes bare ; the sap runs strongly to the fruit branches growing from the upper part of the branch, as they are vertical, they do not fruit but turn into gluttons.

If a branch is given a heavy incline, it will fruit abundantly but the fruit will be small. The sap, refusing to descend, causes the fruit branches which are above the highest curve of the branch to turn into gluttons, the lower part of the branch as well as the fruit branches upon it dry up and the branch itself dies.

Removal of shoots. — This consists in cutting off the useless shoots while still green. As more branches grow upon a tree than are necessary to form its frame or its fruit branches those which are useless and hurtful must be removed while they are still in the condition of shoots.

Still as there is no certainty that a shoot, counted on to form a branch or a fruit branch, will not perish later on, and that then we will regret having too soon done away with the shoots which might have replaced it, great judgment must be exercised in the removal of useless shoots, which should only take place after the eye has become a shoot with leaves and we are sure of the shoot which we have preserved.

1° When several shoots have grown together from the same base, the best and strongest and showing the best direction is chosen and others are completely removed. If the shoot chosen is healthy, the useless ones may be removed a little earlier (fig. 30).

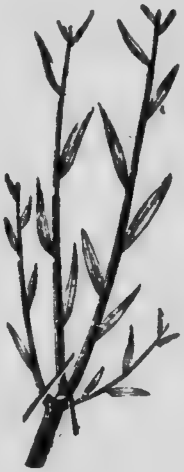

Fig. 30.

2° The useless shoots should be removed from those portions of the tree and branches which are to remain bare. As the trunk of the tree should only have wood branches upon it, all fruit branchs which grow upon it must be removed.

The removal of shoots is favorable to the strength and regularity of the tree, as it frees it from the hurtful branches to the advantage of the parts preserved.

The Removal of eyes.— Consists in the removal of the eyes, the developement of which is not desired.

This proceeding, which requires a thorough knowledge of what we are about, is dangerous, as we can never be certain that the eye, we have preserved and imagine to be a good one, will not be destroyed ; a wiser plan is to wait until all the eyes have grown into shoots, when the good are selected and the others destroyed ; this is left to the prudence of the operator.

The removal of leaves.— Consists in the cutting off of leaves growing too close together which deprive the fruit of light at the time of maturity. This is an operation which, being badly done or done too soon, may bring disastrous results.

A moderate removal of leaves is favorable to the fruit. There is another which may be done at any time and which is most useful, it is the removal of leaves in bunches or where they are too numerous or touch the fruit.

Every fruit touched by a leaf is almost lost ; under this leaf is found a worm which attaches it to the fruit with silken filaments and attacks the fruit. Apples and pears must be at once detached from leaves which touch them.

For several years past, the removal of leaves has been most advantageously adopted as a means of weakening a too vigorous shoot ; a few leaves removed from its extremity having the effect of moderating its vegetation ; it is better than pinching, only two thirds of the leaf should be removed, so as not to injure the eye at its base.

Thinning the fruit.—Nature is sometimes so generous that the trees exhaust themselves and bend over with the weight of their fruit ; man must then come to their assistance and from some of them wisely remove a part of their fruit.

The removal of the superabundant fruit, has a great influence upon that which is left and has the effect of preventing the exhaustion of the tree. During some years fruit is so abundant that there must be no hesitation in putting it into practice.

Arching. — Consists in bending small or even large branches into the shape of a bow or semi-cercle, with the extremity inclining to the ground and of keeping them in that position by binding with the object of causing them to fruit. The sap, running more slowly on account of the bend which it must overcome, will only develope twigs and light branches and fruit buds will be formed. It is a most affective method but we do not recommend its employment on the terminal branches, except in extreme cases, that is in the cases of trees with so much strength that a long pruning followed by a pinching have been useless in forcing them to fruit.

Arching should only be partial upon small lateral branches on the strongest branches and on slender branches, the terminal eye being first removed.

Some growers subject the whole tree to this treatment to force it to an early fruiting. They succeed, but trees treated in this way are quickly exhausted and die in a short time. The fruit becomes small, the sap no longer nourishes it sufficiently, an evil which does not take place when the arching is only partial.

When the whole tree is under fruit, the arched branches should disappear ; the light branches and twigs are sufficient to assure production.

Operations to renew valuable parts.

Renewing.—Fruit branches having only a limited time for fruition, one year for trees producing nut fruit and a few years for those producing seed fruit, these parts of the tree must be renewed when they have become exhausted.

Renewing, well understood, is the most important operation of pruning. Nature is continually carrying on this renewing but as it does not get rid of the exhausted portions, the latter only remain as supports for the new productions, they accumulate and greatly injure the strength and fertility of the tree. Pruning assists in getting rid of these useless portions and in regulating their renewal.

Renewal of branches.—In certain bushes (the gooseberry) the branches become exhausted in a few years, these are cut off and renewed by new shoots from the root. In other fruit trees the renewal of branches only takes place when they are either ruined or unhealthy.

The renewing of old exhausted branches is rarely satifactory ; it is therefore better to preserve these branches by cutting off the most exhausted so as to give more strength to the others. Sometimes however in standard trees and wall growers it will be well to replace the top of the tree by renewing it from the gluttons which grow at the bases of the large branches.

Various operations comprised under the word "Pruning".

The good alone produces good.—Train up good trees with strong branches and fruit branches and they will cover themselves with large blossoms which will regularly produce crops of fine fruit. To create the good and to preserve only the good, should be the first rule in pruning, but it must not be forgotten that to be able to command nature, we must first learn to obey her laws, that is to say pruning must not be a torture, but a helper in the production of valuable parts and in the removal of the useless or of the excess over what is required.

To prune means to remove by cutting off, but under the words " the science of pruning " all operations, the object of which is to assure the growth of the tree, of the plantation of the hedge &c. are included.

Pruning has different names when practiced upon forest trees, ornemental trees, hedges or fruit trees. We cut away if we cut the tree level with the ground; We lay down if we cut off the branches close to the trunk ; we thin when we cut off certain parts of the branches so that the rest may obtain a stronger growth; We prune when we only free the tree of dead or dying branches; we clip if we shorten without distinction and uniformly all the branches of a hedge or row of other trees and lastly, we prune when we desire that each shoot on the tree should develope as we wish into either wood or fruit. This treatise being specially on the pruning of fruit trees, we need not here trouble ourselves about the rules to be followed in the various operations above referred to, still we will give a summary of them.

Cutting away should be done as early as possible ; when the tree begins to vegetate as the moving sap promotes the sprouting of new shoots on the neck of the roots. The cut should be clean, made with a pruning hook and not with a saw, always close to the ground, so that the shoots will form underwood growing from the level of the ground. A stump left standing will rot without vegetating. Laying down is only done when we wish to do away with the frame, reserving only the stem and the lower parts of the principal branches. This dangerous operation should only be attempted if from the quality of the soil and the condition of the roots, good results may be looked for. A strong branch is cut completely off close to the trunk, or a certain length from its base is left by only cutting a little distance above its first, or better still, its second fork.

We lay down on the trunk by leaving the base of the branch, if we wish new branches to grow there, if we do not the branch is cut off close to the trunk removing with it the excrecense which formed its base.

Pruning consists in simply removing the dead and dying branches or those of exceeding weakness. Pruning is practiced upon well formed trees which require only to be freed from the small wood which grows uselessly at the bases of the branches and at the center of the tree.

Thinning.—The effect of thinning is to maintain equilibrium between the branches and to clear the trunk of lateral branches on the parts that should be bare, to force it to increase in length and to assure the straightness of its growth.

The natural form of the tree should be maintained. Some trees take the form of a cone, some are round through the spread of their branches; still in forming a tree it should be done as closely as possible to the two models of a perfect tree: either a straight trunk growing to half its height and surmounted by a well rounded head, or that of a pyramid in certain species. Every branch which is weaker than those of the same age and which have started from the same height, should be removed, if the removal does not leave a bare place.

If a branch divides and gives only two branches of equal strength and both fit for the formation of strong parent branches, a third fork giving a weaker and less durable branch should be cut off if there is more wood than is wanted.

Every branch which grows too fast must be stopped by laying it down on the fork of a lateral branch which will then continue the branch to the level of the branches which form the head.

The top of a tree which is too large or which terminates in a confusion of small exhausted branches may be reduced by shortening the circumference of the top by one third and reaching the part of the branch where it is not larger than the thumb, a laying down on stronger wood would give less healthy shoots.

The strong branches must not be cut off unless they are defective or are very injurious to the tree. It must not be forgotten that no wound will close if larger than one third of the circumference of the stem. It is better to remove these branches when young than to wait until they become too large, more than one severe wound on the same base must be especially avoided.

The form of the tree.

The various forms depend partly on the nature of the species of tree and partly on that of the climate. By the word form is here understood, the general arrangement of the tree We have already seen the changes of more or less importance which take place in the details.

We will speak here only of those generally adopted and recognized up to the present as the best. They are 1° the pyramid or cone, 2° the standard, or lofty tree, 3° the bowl shaped, 4° the bush, 5° the espalier growing against a wall, 6° the vine or creeper. The latter may evidently be considered as forming part of the espalier.

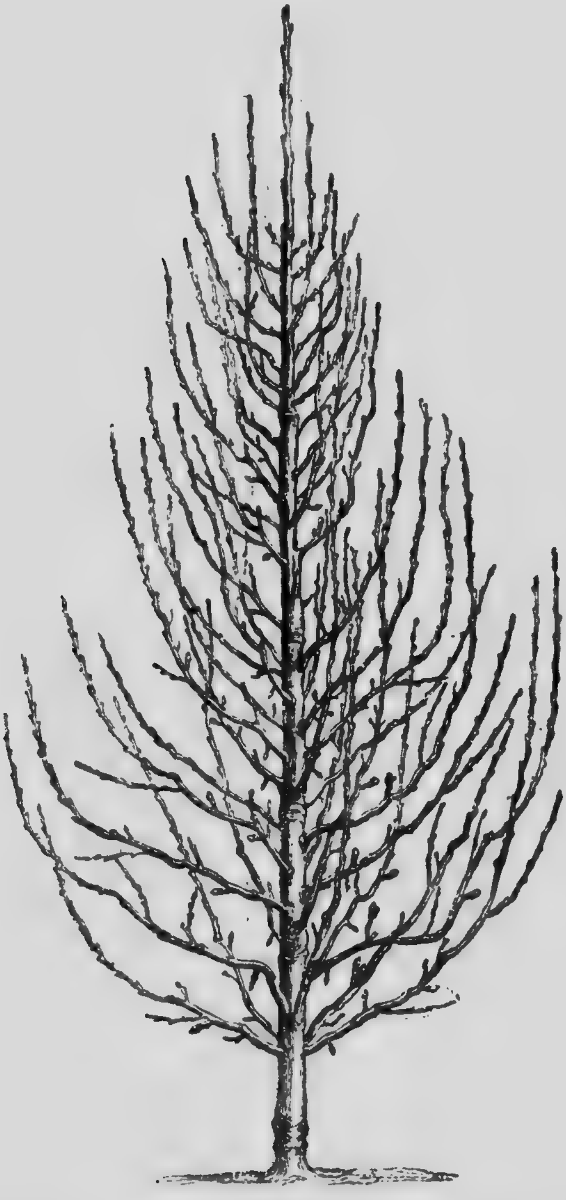

Fig. 31.

The pyramid or cone (fig. 31) most of the trees, generally grown in gardens, may be treated according to this form, but the pear tree is the one to which it is most particularly applicable. This form permits of the growth of the greatest possible number upon a given space of ground.

It consists of a vertical stem furnished with lateral branches from base to summit which diminish in length as they near the top of the tree. These branches form a more or less open angle with the trunk and rise obliquely so as to form a cone, the greatest diameter of which should be about one third of the total length. This is one of the best forms, it permits of the free penetration of light and air to every part of the tree, takes up but little space in the borders and is productive.

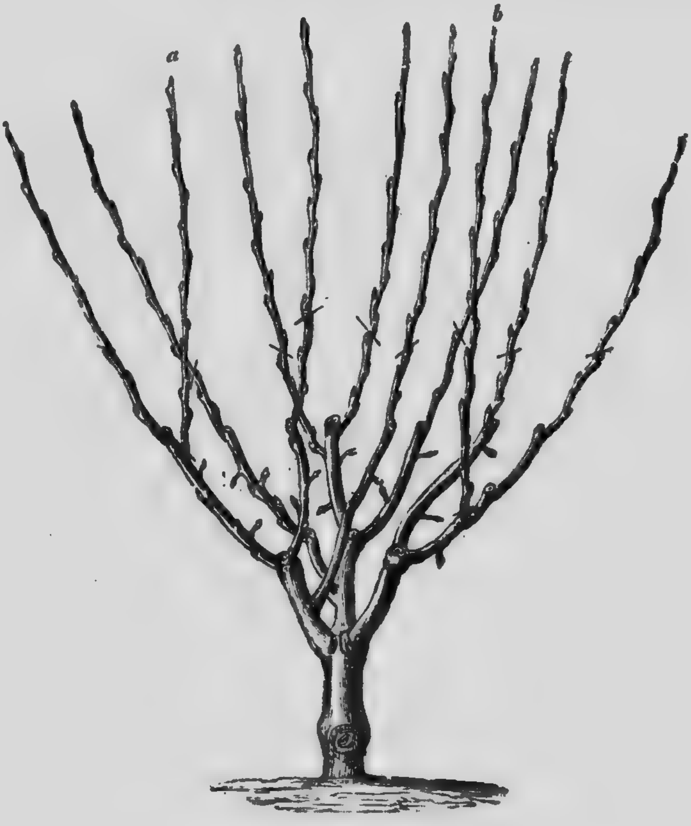

Fig. 32.

The form of the standard is applicable to all kinds of trees. The stems of trees treated in this way, and from which the branches start, are not more than about two yards in height. This is the best form of tree for orchards.

The bowl shaped (fig. 32).—This form may be given to all species of tree except the peach. Upon a trunk kept very short (2 or 3 feet at the most) having two or three branches which with their boughs are trained circularly, the dwarf apple tree, cultivated in this manner, gives very fine fruit, as does also the red currant bush.

The bush.—In this form the trunk is either entirely absent or is exceedingly short; the branches start from near the neck of the root and grow in all directions. Certain bushes, such as the raspberry and the gooseberry adapt themselves to this form better that to any other.

The *espalier* or the wall grower form is suitable for all trees, but more particularly for those the maturing of whose fruit would not be certain in the open garden. This form consists in planting a tree at the foot of a wall and training it in the direction it is desired it should take. The counter espalier is formed along a trellis or any other support, but not along a wall. It may be employed for all trees except the peach.

The espalier and the counter espalier vary greatly in form, but we will not delay over them as they are seldom or even adopted in our province. We will treat of the form to be given to each kind of tree in the chapters devoted to them.

The trellis is a kind of espalier special to the vine.

THE INCREASE

OF

FRUIT TREES AND SHRUBS

Sowing.

A tree grows from a seed; in certain kinds, principally soft wood trees, they may be increased by dividing their parts, the pieces being used to graft certain varieties which are distinguished by the quality and quantity of their fruit and by the beauty of the tree.

A seed, while reproducing a tree of the same species, does not always produce one completely identical with the parent tree. The latter has some more or less marked characteristics; although as a general rule the characteristics are analogous, so that in the whole sowing, the type of the parent tree is reproduced.

The seeds are put into loose and moderately moist ground the depth varies according to the size. They may be sown permanently, or a better way for large seeds is to put them down in layers in fine sand and when they have germinated, to plant them in rows in the nursery.

In putting down seed, that of properly growing trees, suitable for grafting should be chosen, or that of trees capable of yielding good fruit at once and worthy of a place among our valued varieties, these may afterwards be increased by grafting. The latter kind of tree however is rarely seen and is generally grown by amateurs.

The success of a sowing depends above all on the quality and freshness of the soil. But as the necessary kind of soil is not always to be found, the nursery man generally prefers to procure plants of a year old ; others sow their own seed, and if the plant is less strong it is often more thick set, having more fibrous roots and being more certain to succeed after transplanting.

The seed of a wild tree will give a hardy plant but of capricious vegetation and slow of growth. The seed of small fruit produces good growing stock but not durable ; that of the varieties yielding large table fruit, produce a stock well developed in wood and leaf but liable to become exhausted through an excess of fructification ; further than this some stock has a weak vegetation and the wood is sometimes kankerous.

The words species and varieties must not be confounded. The pear tree is a species, but certain stock the results of grafting, being increased by division constitute the varieties.

Stratification.

Stratification is, in reality, a kind of provisional or anticipated sowing, carried on under special conditions which permit of the final sowing of the seed in the ground, when it is on the point of germinating. Stratification is also practiced for seeds which quickly lose the germinating faculty when they are exposed to the air but which still cannot be sown at once either on account of the cold or damp or because they might be eaten by birds or animals.

Stratification is done by placing alternately a layer of seed and a layer of sand or sound earth, so as to isolate the seed somewhat and to prevent decay when it is beginning to germinate.

According to the quantity of seed, it is placed in pots, pans, baskets or boxes, which are then placed in a cellar or out house, sheltered from the cold or too much moisture, which might cause the seed to rot, and to save it from destruction by rats or mice.

Sometimes stratification is done outside, along side of a wall with a good exposure ; In such a case the earth is raised and if necessary a little trench is made round the mound at its base, to make it wholesome. If necessary it is protected, in the spring by straw or manure.

When fine weather has set in, the seed is sown mixed with the ground which contained it, so as not to lose any of it, unless it is too large. In which case it is planted in the open ground.

Sometimes, when the seeds are of a kind which should not be allowed to dry, because germination may be injured or retarded, they are sown at once and the pans or vessels are placed in the germoir (1) and there kept until such time as they may be placed in the open air.

1—The germoir is the name given to a place sheltered from frost, a sort of out-building, where the pots and vessels are placed on shelves or on the ground, where they can be kept in sight. The temperature need not be high, but the place must be free from frost.

Another great advantage, which stratification offers, is that the seed need only be put into the ground at the moment it begins to germinate, that is when is has arrived at the period of activity, so that it will find there, in new soil or in soil newly prepared, the conditions most favorable to its growth. Again by following this method, the land to be used is left free for other purposes for quite a long period.

The layer.

A branch still attached to the tree inclines towards the ground and becomes accidentally half buried, the portion bent into the ground takes root, the extremity of the branch grows a stem and forms a new plant, which may be detached from the parent root; this is called a layer (fig. 33). Hard wood trees do not readily take by means of layers; yet if the branch is still half green it will succeed in some kinds of tree.

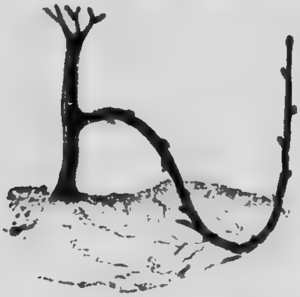

Fig. 33.—Layer

In Flanders a fine variety of elm is grown by this process to adorn the highways, it has a straight stem and large leaves and is much preferred to the trees with small leaves which are found along some of the roads. Fruit trees particularly, with soft pithy wood, take the most readily by means of layers. To retain the layer in the ground it should be pinned down by a wooden fork or otherwise.

The slip.

Trees increase by partition with more or less facility.

A portion of a branch, or as it is called a slip or cutting (fig. 34) partly buried in the ground with one or two eyes at least under the ground and as many above, throws out roots and produces a plant exactly similar to the tree from which the cutting was taken.

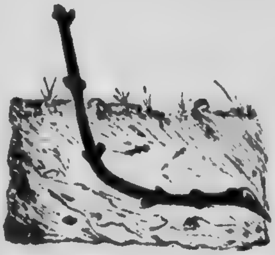

Fig. 34.—Slip of a vine.

There are many conditions requisite for the success of a cutting. It is done with a leafy branch, but more surely under the shelter of a bell, or else with a branch detached at the pruning season and then completely or partially buried until such time as the heated ground permits the planting aud assures its growth.

The younger the wood and the more it is taken from a tender and pithy kind of tree, the quicker and more easily will it throw out roots. Wood of a year old is most used; pieces of old wood turn black and rot and are therefore useless.

The principal roots only grow from the first two or three buried eyes which are nearest to the surface, these eyes throwing out roots the more easily, the nearer they are to the surface of the heated ground ; from the eyes which are buried deeper nothing grows but small fibres which rot away in a very short time.

Two eyes under ground and two above ground are generally sufficient unless the cutting is strong. As each eye throws out roots intended for the shoot which sprouts on the same side, each cutting should have two eyes at least one on each side, so that there may be roots on the whole circumference of the stem and also two eyes at least above the ground so that there may be shoots also on each side.

If a cutting only throws out a single root on one side of the stem, this root will favor the shoot sprouting on the same side and will have a tendency to create a new stem of this shoot, abandonning the rest of the cutting.

The lower part of the slip should be cut immediately below the eye to facilitate the coming out of the root from the base of this eye. Pear and apple trees grown from cuttings, a matter of great difficulty with some varieties, give but middling results, if the growth of standard trees is intended. Among a number of slips carefully put down, two thirds died and the others only produced delicate trees, small and of no durability, which went to fruit in five or six years and which showed no advantage over the grafted tree. September is the best time to make cuttings from woody plants with few exceptions.

Growing from layers and cuttings or slips answers well for fruit bushes but is seldom succesful with large trees.

Grafting.

GENERAL PRINCIPLES.

The operation by which a part of one plant is applied to another so that it may unite and grow with it, is called grafting.

The name of graff or graft is given to the portion cut from a plant, which it is desired to increase, such as a twig or a bud.

The graft by branching is the exception, this operation consists in uniting two parts still adhering to the plants that bore them. The tree or plant receiving the graft is called the stock.

That the connection may be sure and lasting there must be a sufficient analogy between the stock and the graft in their manner of vegetating, in the ascending and descending movements of the sap, in the quality of their proper juices and lastly in the characteristics which constitute them into species, genus and families.

Grafting is a means of preserving and increasing rare and valuable species and varieties, by placing upon common stocks grafts which have been obtained by sowing; this latter method only reproduces very imperfectly, and often even completely different from the original type. Grafting also accelerates their fructification by several years.

The spring and summer are generally the best seasons for this operation. There are however exceptions which we will point out. In the spring the time chosen should be during the ascension of the sap. If the operation is done in summer, it should be before the sap has completely stopped rising. The intelligence of the operator must seize the favorable moment which is difficult precisely to lay down as it varies according to the state of the temperature. It is essential that the young portions of the graft such as the liber and the sap wood should coincide as perfectly as possible with those of the stock : the adhesion will be more prompt and assured. The operation must also be performed with the greatest rapidity so that the contact with the air may not have time to interfere with its success by drying the cuts.

Although the stock has not the influence on the graft which many attribute to it and does not change the character of the species, it often improves the flavor of the fruit, which grows with more or less vigour, or adds to the durability of the life of the graft. We will therefore point out those which are most suitable for the different species of fruit trees when we treat of each in particular.

Preparation of grafts.

The grafts must only be taken from wood of one year old : two years old wood goes to fruit sooner, but the tree is not as strong ; it should only be employed from necessity or when there is no other.

It is essential that the grafts be taken from healthy and fertile trees; the branches which have had the influence of the air are always preferred as the eyes are better formed Twigs and small branches should be employed as little as possible for grafting in clefts or in crown grafting.

The branches should be cut off a month or six weeks in advance, during this interval of time they should be stuck into the ground, at the foot of a wall with a northern exposure, to the depth of one third of their length. The hardships, to which they are exposed, starves them and makes them more liable to take.

They must not be kept in water, except in cases where they have been carried a distance and are somewhat faded on arrival, in which case they should be soaked in water for a day or two Failing these, fresh cut branches may still be employed.

For ordinary grafting, the branches may be cut for immediate use.

A tool, called a grafting knife, is generally used for grafting (fig. 35). It is a kind of small knife, the blade of fine steel, should be sharp and about ten inches long, the handle also about ten inches in length should have a spatula made of ivory or bone at the end. The grafts are cut with the blade and with it also the incisions and notches are made in the stock. All the parts but particularly the blade should be kept scrupulously clean The spatula is used for detaching and raising the bark. Other tools employed are, a hand saw to cut the stem or the top of a large stock or strong branches; a strong pruning hook and a small mallet to strike it when necessary; several wooden wedges of various sizes to keep the cleft open until the graft is placed in position and to detach the bark from the circumference of the stock when the graft is on the top of the tree. When the stocks are small, the pruning hook will answer to make the cleft and to keep it open.

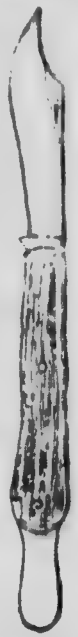
Fig. 35.

To fasten the grafts in position, bandages are required, they are generally made of rough spun wool, slightly twisted or of cotton rope.

These two substances, especially the first, have the advantage of being more elastic, and of lending themselves more readily than any other to the swelling of the stock or of the graft, strips of birch bark are difficult to tie. Hemp, which shrinks with moisture, is liable to choke the graft, still it is sometimes used The grafts should be examined from time to time and the bandages loosened or removed if they cause contraction injurious to the growth of the shoots.

The following articles are used for the protection of the grafts.

Grafting wax.—Of this there are two kinds, one used hot and the other cold.

The composition to be used hot. — One pound of white Burgundy pitch, one quarter pound of black pitch, as much rosin, four ounces of yellow wax and two ounces of tallow are melted over the fire in an earthenware jar and mixed while melting. When this wax is to be used, the jar, containing it, is placed over a slow fire and it is applied with a pallet (spatula) or brush when hot enough to become liquid without being so hot, as to injure the cuts.

The composition to be used cold. - One pound of yellow wax, one pound of oily turpentine, one half pound of white Burgundy pitch and three ounces of tallow are melted in the same way and mixed while melting. This is made into sticks and wrapped up in a cloth or in paper and when required, a piece is taken off and kneaded between the fingers until sufficiently soft. The proportions of these two compositions which completely resist the inclemencies of the seasons, may be increased or diminished at will.

Ointment of Saint Fiacre is a mixture of two thirds of fresh earth, somewhat clayey, and one third of cow dung, mixed to the consistency of thin mortar. Its consistency prevents it from adhering in quantities, it may be dried by the sun or washed away by the rain, it should therefore be wrapped round, with a cloth to retain it on the cuts for the necessary time. This arrangement is called "poupée." This composition is largely used in country parts for grafting in clefts or at the crown of the tree. When grafts have to be carried a distance they are placed in moss, slightly moistened enclosed in a box, in oilskin, or simply in heavy brown paper. This will answer when the journey does not last more than fifteen days. If the voyage is to last two or three months the grafts should be placed in putty or honey or even in pure clay Well covered by these substances they are then placed in a tin box hermetically closed. By this means they will be preserved perfectly.

Various grafts.

I do not intend to describe all the different grafts known. There are numbers which are not generally practised. I will only refer to those easy of execution and generally employed.

Grafting in clefts or by young shoots

This section includes grafting in clefts in the trunk, in the roots or in the side branches and also those on the crown of the tree.

The spring, when the sap commences to rise in the stock, is the proper time for this kind of grafting which is largely applicable to trees producing seed fruit and to some of the nut producers. For the latter such as the plum tree, the cherry &c., the month of August suits better, success is more certain Grafting in clefts must be done on stocks of various heights, from the neck of the root up to two or three inches. The cuts must be trimmed smooth with the pruning hook and branches with the best formed eyes should be chosen.

Grafting in clefts with one shoot.

Figure 36 shows : *a*, a stem with the head cut off, *b*, shoot planted in the centre of the diameter, *c*, a trimmed branch with two eyes. On a stock to receive a graft, a smooth place is chosen at the desired height, the head of the stock is cut off horizontally with the pruning hook, when it is light ; if too strong a saw is used, and the cut is immediately smoothed off ; a shoot is then planted perpendicularly in the middle of the diameter of the stock, cleanly, without chips and without tearing the bark. In trees bearing nut fruit, the pith should be saved from injury

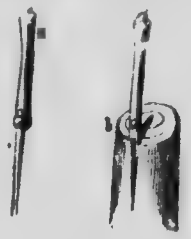

Fig. 36.

as much as possible. If the stem or the branch is strong, the cleft is kept open by a small hard wood wedge or by the point of the pruning hook so as to insert the graft *c*. The graft is trimmed to an edge, like the blade of a knife, three or four inches long, according to the size of the shoot, making two small grooves or notches above the edge, as shown at *e*, so that it may rest easily on the cut in the stock ; the graft is then placed in position by slightly inserting it so that its bark, which is thinner than that of the stock, may coincide perfectly with the latter. When the graft is fitted in, the little wedge is removed carefully so as not to disturb the graft. Bandaging is not necessary if the pressure is strong enough and holds sufficiently. If however it is weak, bandaging is necessary to bring the parts together and to keep them in position until the taking is assured. The cuts should be immediately covered with grafting wax or with ointment of Saint Fiacre.

Grafting in clefts with two shoots (fig. 37)

It only differs from the graft with one shoot (fig. 36) in the number of shoots placed upon the stock. The operation is absolutely the same, except that the two shoots are placed on opposite sides of the circumference of the stock. It is

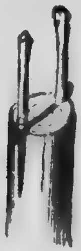

Fig. 37.

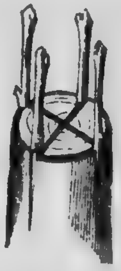

Fig. 37 *bis*.

generally employed upon strong free stock or on strong branches.

Grafting with four shoots (fig. 37*bis*) is seldom practised. The stock, split into four parts, presents a wound difficult to heal.

A graft in a cleft, operated on a rose bush in a similar manner, will produce flowers a few months after the operation. The stock should be two years old to assure the success of the operation.

Grafting in a cleft on the neck of the root (fig. 38).

It often happens that a tree, several years after its planting and when it has attained a certain size, is broken off by the wind or some other accident at a certain height and sometimes even close to the ground. Instead of rooting it up, it is grafted above the neck of the root by attaching two shoots as shown in figure 37. During the first year sprouts of two yards long, will be thrown out By this process advantageous results are obtained and a new tree is speedily created. One of the two shoots is removed during the second year, so as to obtain a tree of high growth.

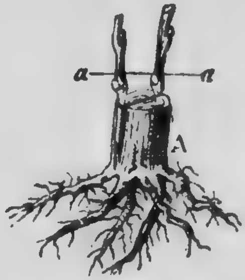

Fig. 38.

Grafting in clefts in the roots (fig. 39).

Trees with seed fruit and sometimes those with nut fruit are grafted by clefts in the roots. In such case a root is cut from a congenerous tree close to the neck, the upper portion is straightened and it is given an almost vertical position without disturbing the secondary roots which are found along its whole length, the ordinary grafting with a shoot is then

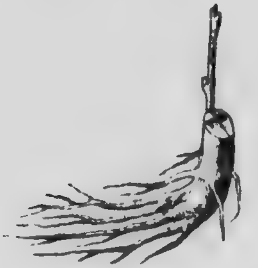

Fig. 39.

effected. The following year this root is taken up with its sprout and is transplanted under favorable conditions and forms a tree in a few years. This system of proceeding is most useful to those who have valuable species for grafting, but have no stocks to receive them.

Grafting in clefts in the side.

This grafting is done in May and June. The shoot to be grafted is trimmed to an edge about an inch long in the shape of the blade of a knife, without a notch on the upper part. A cleft is made on the stem of the stock with the end of the pruning hook penetrating the wood sufficiently to allow the insertion of the graft (shown in fig 40).

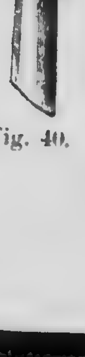

Fig. 40.

This grafting is most useful for the replacing of lateral branches which have been destroyed, or for growing branches on parts that are bare. It is principally employed on trees producing seed and nut fruits. Bandages and grafting wax are necessary after this operation.

Crown grafting.

It is so called because the grafts are placed upon the stock in the form of a circle or crown. These grafts are generally made on strong stems or branches. This kind of grafting differs from grafting in clefts in that instead of being inserted in a cleft, the grafts are inserted between the bark and the sap wood. It is done between the 20th of May and the 20th of June, but the stock must be in sap so that the bark may be easily separated from the sap wood; the branches should be cut a month or six weeks in advance in the same way as when prepared for grafting in clefts.

When old trees are regrafted it is better to allow one or two supplementary branches to remain to keep the sap in the stock; success is more assured. The removal of all the branches at the same time would injure the tree. The supplementary branches are arrested in their growth, in proportion to the growth of the grafts and after a time completely cut off so as not to injure the latter.

Ordinary crown grafting.

The stem or the branch is cut horizontally with the saw and the wound immediately smoothed with the pruning hook. The shoots are trimmed to a point as B in fig 41, having two eyes on each. With the assistance of a small hardwood wedge, the bark is detached from the sap wood without tearing and the graft is introduced. According to the size of the stock, an indefinite number of grafts may be introduced, by placing them one inch apart on the circumference; the tearing of the bark will not affect the success of the operation. It is succesfully employed on large branches which are brought together

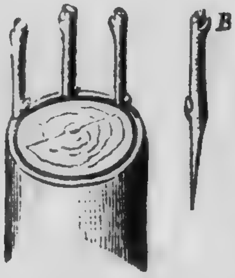

Fig. 41.

bandanges are not used but the whole wound is covered over with wax.

This graft has a variety which only differs from it in that the bark of the stock is cut perpendicularly where each shoot is inserted which permits of convering them with the sides of the incised bark ; in such case a bandage is necessary.

A crown graft by a triangular cleft.

On the face of the cut on the stock, which is always horizontal (fig. 42) a triangular cleft is made proportioned to the size of the branch to be inserted. The graft is trimmed at an angle so as to exactly fill this cleft and is inserted in such a way that the barks shall coincide, the wound is then covered with grafting wax and bandaged. By this method large trees may be grafted and many grafts put upon the same stock.

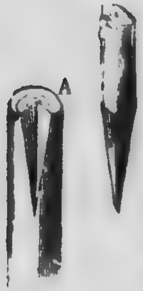

Fig. 42.

The Ferrari or Genoise graft.

This is the inverse of the last described, as shown by fig. 43. It is more generally employed, particularly for small orange trees.

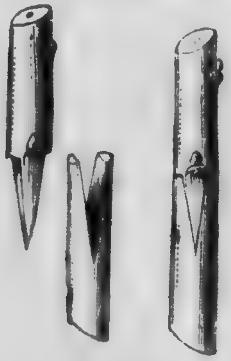

Fig. 43.

English graft.

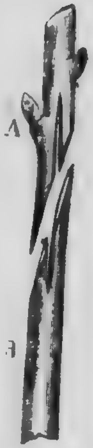

Fig. 44.

This is a very solid graft. It is employed for small trees of equal diameter. The stock B, (fig. 44) at its summit and the branch A at its base, are both trimmed to a long bevel edge, about the middle of the face of each bevel splinters of the same size are made, as shown in fig. 44; the splinters are made to penetrate one another when placing the graft in position and in making the barks coincide. It is then bandaged and covered with wax. This grafting is done in the spring.

Grafting by bringing together.

Nature has furnished a model of this grafting. It is very simple and is distinguished principally by the fact that both the stock and the graft continue connected with the trees that produced them until the taking is assured and they may be separated. The tree to be grafted must be very close to the one furnishing the graft, so that they may come together easily. There are a great many grafts of this kind, but only a few are employed for fruit trees. Most of them are applied to ornamental trees and shrubs.

Spring is the most favorable time to carry them out especially during the rising of the sap. They may also be very successfully operated in the summer by using the still green shoots

Ordinary close grafting (fig. 45).

This operation consists in making upon the stock and graft as near as possible of the same size, wounds or clefts of equal dimensions, fitting exactly the one upon the other when they are brought together These clefts penetrate through the sap wood and to the wood. When they are brought together the libers should be in contact at almost every point. The junction is maintained by bandages suited to the expected resistance and the wounds are protected as much as possible from the influence of the air and damp. The bandages must be watched to prevent them from forming contractions and they are cut away when the taking is assured. For this purpose we commence by notching the graft below its part of junction fifteen days in advance, eight days afterwards the notch is prolonged to two thirds of the thickness, finally the cut is made.

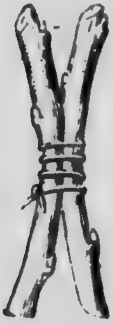

Fig. 45.

Then the head of the stock is cut off above the bandage. This grafting is of little value for trees which grow in our climate

Close grafting with a splinter.

As done in the preceding graft a cleft is made in the stem of the stock and of the graft, a splinter is cut in each of the corresponding clefts in an inverse sense (fig. 46) and

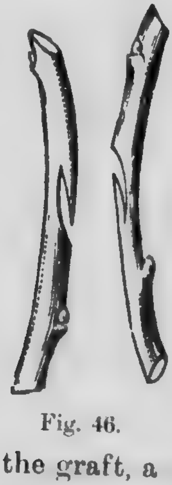

Fig. 46.

the two clefts are brought together the splinters joining like a hook and eye : the whole is then bandaged. This graft is firmer than the previous one.

Close grafting with green or herbaceous shoots.

This graft is operated in June, July and August on almost all fruit trees with the same success. It is one of the best ways of replacing branches on places which have become bare (fig. 47) and of furnishing the tree with branches where none have ever grown.

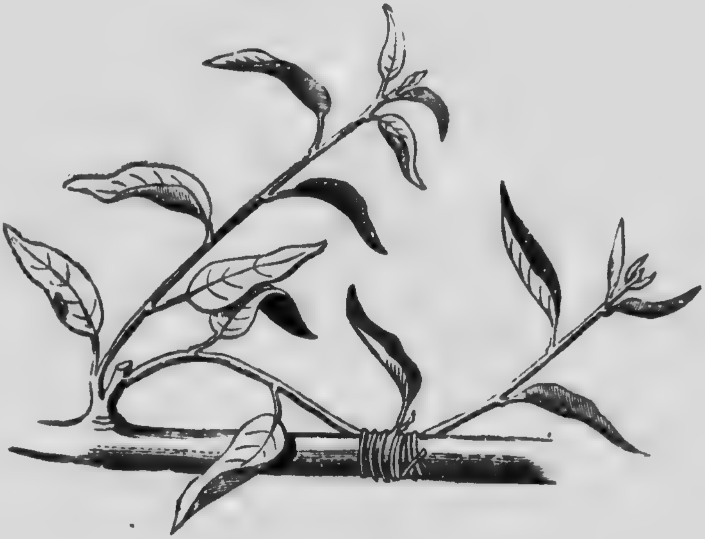

Fig. 47.

It is also employed with great advantage on vines to fill the vacancies caused by ill placed shoots and strands (fig. 48) : an ordinary cleft of about an inch in length is made with the grafting knife at the point where a branch is wanted. A neighbouring shoot, fairly strong, is taken, the wood is cut away to more than half its thickness and to the length of the cleft, leaving an eye on the upper side at the middle of the cleft. The shoot is then carefully placed in the cleft in such a way that the barks will coincide. It is then made fast with woollen, linen or rush bandages. In three weeks or a month this graft will have taken perfectly. If contractions take place, the bandages must be loosened but not removed. It is better to remove them in the following spring before the rising of the sap than in the autumn of the same year.

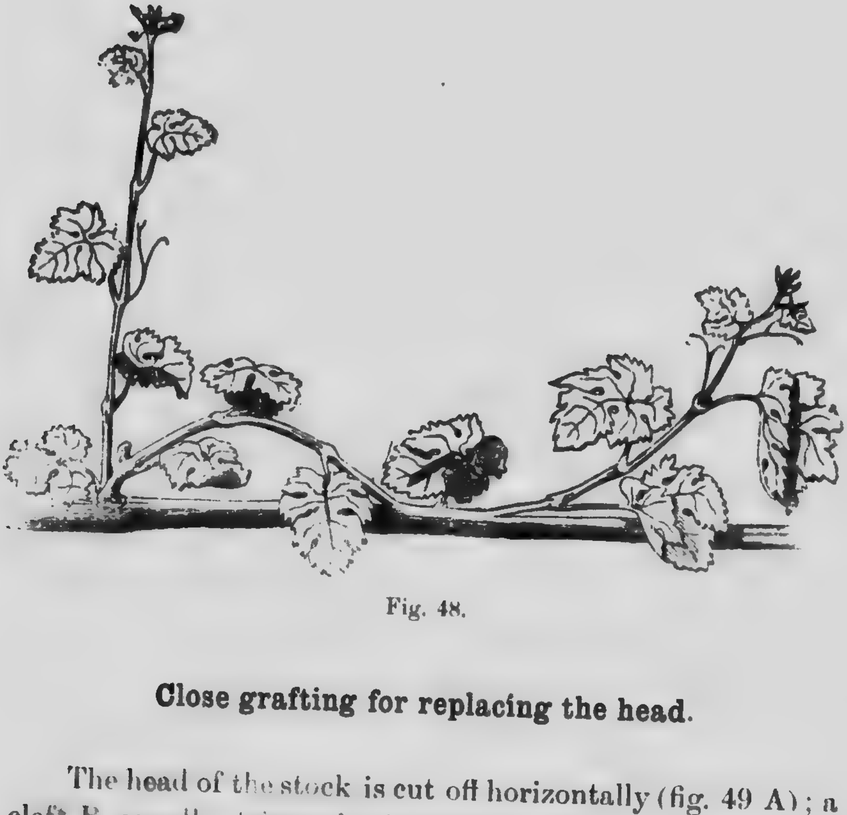

Fig. 48.

Close grafting for replacing the head.

The head of the stock is cut off horizontally (fig. 49 A); a cleft B equally triangular is then made in the stem of the graft at the necessary height and below the head; the size of this cleft must correspond exactly with the cleft on the stock ; the two parts (fig. 50) are then placed the one upon the other and are solidly held in positions by means of bandages ; grafting wax is then applied.

This graft may be employed to renew the top of a pyramid or to prolong a lateral branch which has suffered from some accident. It is also advantageously employed on young stocks in pots, from which the heads have been cut, which may be placed within reach of the branches of the tree which is to supply the grafts.

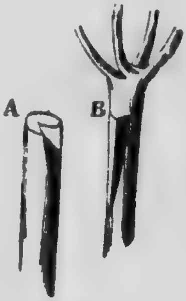

Fig. 49.

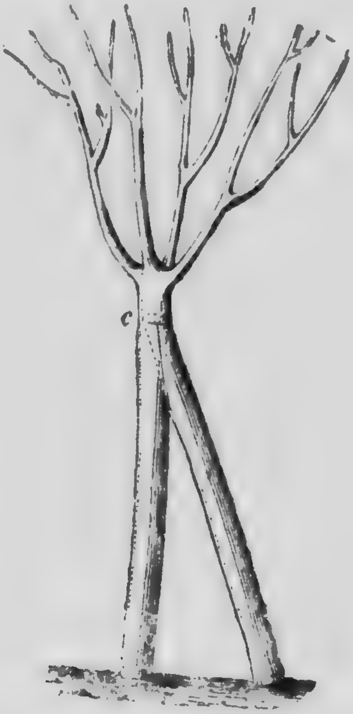

Fig. 50.

Grafting with a scutcheon.

Grafting with a scutcheon is very expeditious and much employed in nurseries principally for small stocks. It is performed in two seasons : In the spring when the eye is growing and in the summer when it is dormant. The latter which is much employed is the better for all kinds of fruit trees; that practised in the spring with a growing eye is of small advantage and the results are doubtful, except for the mulberry tree. Rose bushes are also grafted by this method, but they do not live as long and are never as fine as from a graft with a dormant eye. The latter is made with scutcheons taken with shoots of the same year, cut in the morning or the evening. Sweating is lessened by the immediate removal of the leaves but the leaf stalks must be preserved for the continued protection of the eyes. These branches must be kept in a cool place, wrapped in moss or in a damp cloth until they are required for use unless they are used immediately.

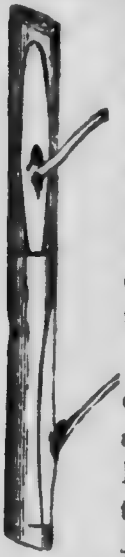
Fig. 51.

The graft with a growing eye is made with eyes taken from branches of the preceding year and from young shoots when it is practiced in May or June. To raise the scutcheon (fig. 51) a transverse incision is made upon the branch 3 or 4 inches below the eye which has been selected and then from 4 lines above the same eye the pruning-knife is slid down under the bark to the transverse cut removing any wood which may have adhered to the bark. When there is an abundance of sap in the stock, a little wood adhering to the bark will not do any harm. If the stock requires pruning it must be done some days in advance as the removal of shoots or buds may for a time, reduce the running of the sap, which would injure the taking of the graft.

Grafting with a scutcheon with a dormant eye.

Upon a smooth part of the stem of the stock a transverse and a perpendicular incision are made in the shape of a T proportionate to the length of the scutcheon; the lips of the bark are raised to the right and left with the spatula of the grafting knife and the prepared scutcheon is slid underneath it downwards, cutting off any portion which may reach beyond the transverse incision in the stock : the bark of the stock is then turned down over the scutcheon holding it firmly so that there may be no void between the different parts and the whole is bound round with a coarse woollen bandage.

The bandage may be begun above or below the eye, but the latter must be left uncovered and the bandage should be more tightened above when there is little sap than when there is much, so that it may flow there in larger quantities. A fortnight or three weeks afterwards the graft should be examined to slacken the bandages if necessary, because a contraction often takes place which cuts the shoot and renders it liable to be broken by the wind.

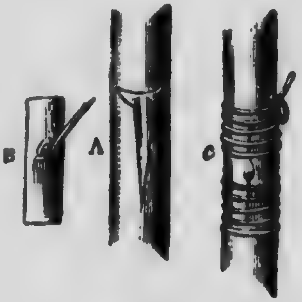

Fig. 52.

If it should rain when the grafting is finished the water might penetrate the tranverse incisions mix with the sap and drown the eye which becomes black. The eye may also be drowned when it is flat, weak or attached to an immature branch. Should the sap be too abundant in the stock, a very light incision is made in its bark one inch below the graft; this will be sufficient to prevent too great a flow of sap to the scutcheon. Figure 52 A shows the stock with the T

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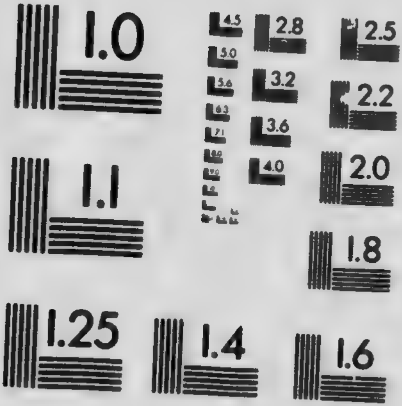

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shaped incisions, B shows the scutcheon and C, the finished graft. The following spring if the scutcheon has taken before the rising of the sap, the upper part of the stock is cut off a little distance above the scutcheon, leaving however one or two supplementary eyes above. The shoots from these eyes are pinched when they have attained a length of 12 or 15 inches to assist the development of the graft. When the graft itself has reached a length if 10 or 12 inches, these shoots are removed altogether.

Graft with a growing eye.

This graft is made in the same way as the preceding, except that eight or ten days after the grafting and when the graft has taken, the upper part of the stock or branch above the graft is removed, allowing always one supplementary eye to remain above the graft The shoot should be pinched when it has reached a length of 12 or 15 inches and it should then be treated in the way, we have just described, for the dormant eye.

Graft with a scutcheon inverted.

The scutcheon is cut off in precisely the same manner. The top is trimmed to a point and it is introduced from the lower part upwards. A transverse incision is first made and then a perpendicular one is made from it which forms the inverted T (fig. 53).

This is an excellent method especially in wet weather, or when the sap is too abundant in the stock ; still it is not often employed because it takes more time

Graft with a square scutcheon.

Instead of cutting the scutcheon as in the preceding method, a square piece of bark with one eye in the middle is taken. Two parallel transverse incisions, at the proper distance from one another, are made on the stock, a perpendicular incision is then made from one to the other of these incisions and exactly in the middle, the two portions of the bark are then raised and opened like two small shutters, they are then trimmed on the edges so as to make room for the eye ; the scutcheon is then placed in position, the two portions of bark are laid over it and the whole is loosely bound. Figure 54 shows this graft : A, the incised stock ; B, the square scutcheon.

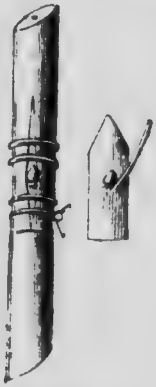


Fig. 53.

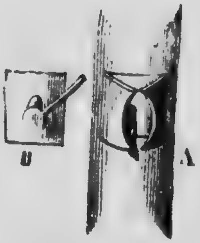


Fig. 54.

Plate grafting.

On fruit trees this method of grafting is done in the spring when the sap is rising. A square plate of bark furnished with an eye and a little of the wood is taken off and inserted in a corresponding cleft cut in the stock ; the whole is then bandaged if necessary and covered over with composition all except the eye which remains uncovered. Figure 55 shows, A, the stock with cleft ; B, the graft.

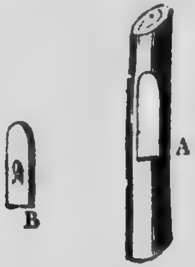


Fig. 55.

This is a most useful graft for branches and for bare parts of the tree.

Grafting of fruit buds or small branches.

This graft is made between the middle of July and the 15th of August, according to the soil and the season, when the buds are formed upon the trees and before the flow of the sap has become weak. Fruit buds are easily recognized : they are larger and rounder than wood eyes and are always surrounded by five or six leaves. A young twig with its base or even a small branch with several fruit buds upon it is taken from a tree which has too many, and placed upon another tree which has few or none, in precisely the same way as the graft with a scutcheon after which bandages are applied (fig. 56).

As soon as the buds have been detached from the tree, the surrounding leaves should be taken off, the leaf stalks however must be left.

A twig may also be used without its base ; in such case a cleft is made and it is put into position as a crown graft on the side. Terminal buds are preferable to others when they can be obtained. They hold to younger wood than small branches will and a succesful graft is more certain.

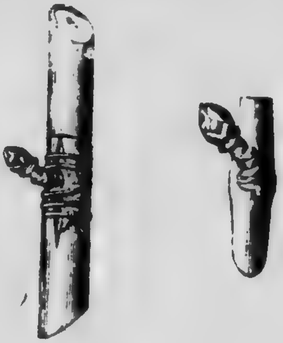


Fig. 56.

These methods are most useful in bringing trees to fruit and in growing branches for the frame of the tree on places that are bare, and we recommend their employment whenever an early fruiting is wanted. Besides the trees bearing seed fruit, the cherry, the plum and other trees bearing nut fruit are also grafted in the same way. In addition to the advantage of early fruiting this kind of grafting has also the effect of often giving larger fruit than that coming from buds which have not been grafted. Lastly different varieties may be grown on the same tree. At the same time to obtain a better success, healthy trees and young buds and twigs should be selected and they should be placed preferably on wood of one or two years growth, although they may succeed on older wood. There must not however be too many of these grafts as they have a tendency to become easily exhausted, a tendency which may be overcome by reducing the production of fruit.

Grafting of twigs is done with equal success by grafting in clefts. Wood is obtained from the supplementary eyes and fruit from the buds, the month of August is the best time for the latter method of grafting.

THE ORCHARD

The orchard is the place specially reserved for fruit trees of lofty growth.

In the preceding chapters we have treated of the general care to be given to fruit trees. We will now take a rapid glance at the particular species which are best adapted to our climate and which consequently will give better returns. As we have already stated the cultivation of fruit trees is not a simple pastime. It is a branch of agriculture which, carefully carried on, brings solid advantages to those who undertake it. Once well established in our country, it will save us the expenditure of large sums of money which we lay out annually in the purchase of foreign fruit.

We import annually more than $3,000,000 worth of fruit, both fresh and preserved. It is true that from this sum nearly $2,000,000 must deducted for kinds of fruit which Canada cannot produce, but the difference is still sufficiently large to claim our serious attention. We should therefore not neglect our home market any more then we should lose sight of the great advantages which are open to us in the markets of foreign countries

We desire to impress these facts upon the reader, because we have the sincere conviction that our farmers should not allow themselves to be outdone by those of other countries and because we firmly believe that if money and labor have to be expended in creating a good orchard, there will be rapid compensation in the handsome return realized.

In the report of the Department of Agriculture for 1903 Mr Auguste Dupuis writes:

" If our farmers would undertake the fruit growing industry with as much energy and intelligence as they display in the other branches of agriculture they would earn three millions of dollars which now leave the country annually for the benefit of people of foreign lands. Besides these $3,735,173 worth of foreign fruits the Canadians consume annually at least $2,000,000 worth of Canadian grown fruit ".

Should we neglect such an important home market and look on with indifference while foreign nations, even the most distant in the world, are rapidly taking possession of it ? These foreign nations have studied and seem to understand the tastes and wants of the Canadian consumer better than we do ourselves ".

In treating of each of the species of tree of lofty growth we will point out certain conditions which are special to each of them. At the same time as there are certain general rules which must always be observed, we will submit some of them to the attention of the reader.

The Influence of space, of air, of the sun and of temperature on fructification.

In a preceding portion of this work we have alluded incidentally to the influence of the air and of the sun on fructification, we will now treat the subject at greater length.

Fruit trees, to be productive, require space, air and sun ; placed in too close proximity to one another, they give poor returns. Whether it is that the roots under the ground contend for the valuable elements of fructification or whether from some other cause of which we are ignorant, trees, especially those of vigorous growth, grow wood, but produce but little fruit when their branches or their roots meet either in the air or under the ground.

The branches of a tree also require to be able to spread themselves freely in the atmosphere without being impeded by the immediate contact with neighbouring branches ; fruit trees which are too thick and bushy remain barren or nearly so. The pyramidal shape is not favorable to the fructification of standard trees It would be necessary and easy, during their first years, to train them in a way to force their frame branches to extend and to secure to them the direct influence of the air and the sun, by cutting off the branch which should form the continuation of the stem. This operation might even be performed with advantage upon full grown pyramidal standard trees, if still in vigorous growth. The pyramidal form is however rendered productive in gardens, but this is done by various devices in pruning which will be explained in treating of the pear tree.

The free access of the sun is as indispensible to the abundance of the harvest as is that of the air itself. Shade is fatal to it. Trees grow wood but give but little fruit when the sun does not reach them freely : the inside fruit branches, shaded by the other branches of the tree, produce but small quantities of fruit.

The same conditions are equally necessary to the fine quality of the fruit. Fruit grown in shady places is generally insipid and watery ; that grown upon trees trained against a wall, the branches of which are always fastened and immoveable and which cannot consequently have the advantage of the air and of the free movement of its branches is far from having the quality of fruit grown upon a standard tree. It is only to avoid the inclemency of the seasons, the natural difficulties due to the changing climate and the severity of the winters, that, in creating an espalier, the tree is reduced to a kind of bondage.

Therefore, in one word, everywhere, space, air and the sun are the indispensible elements of a good and abundant fructification.

All the methods of pruning which we have considered tend to give the tree a promise of fruit, but they are all powerless of themselves to give the assurance of a crop. That the flower of the spring may become a fruit in the autumn it must be favored by suitable atmospheric conditions.

Fruit in our climate fails when the temperature is not in keeping with the season or with the demands of the fruit itself. So at the time of flowering or immediately following it, an excessive heat or a sharp spell of cold will equally cause the failure of the fruit. The latter while still young, especially pears, become black and drop off the trees from the effect of wind or of a too powerful sun. On the other hand unseasonable cold paralyses the absorbent action of the organs which elaborate the nourishing sap for the fruit, they then drop from the want of suitable nourishment : for succesful growing of the fruit of our country a moderate temperature is required sudden changes are to be feared.

Alternacy of fruit trees.

It is with the greatest difficulty that a tree can be successfully grown in the soil where one of the same species has died of old age ; the ground, in which it grew, although suitable for all other products, refuses obstinately to support a new generation of the plant which occupied it for so many long years. For nearly forty years, says Puvis, we have striven in vain against this difficulty ; we desired to restock an orchard of three acres in which the soil was deep and of the best quality ; it is true however that it consisted of the third or fourth generation of the same species of fruit trees ; in replanting we endeavoured to replace the apple trees by pears and vice versa. We avoided as much as possible putting the new trees in the same places as were occupied by the old trees. Some of our trees died and those which continued to grow, produced but little, although some of them gave every appearance of health and strength.

Still for some years part, certain agriculturists have called in question the necessity of alternacy, that is the causing of one plant to succeed another of a different nature in the same soil. It appears to me that this is a denial of what has been established by the experience of all time and in all places. There is not a farmer or gardener in any country in the world, who has not from his own experience, been able to satisfy himself of the reality of this law. It may well be said that the experience of the fathers is lost upon their children : how happy they are, to be able in some way to prove that their parents were wrong, but they generally have to pay with their pains for their desire for innovation. Fortunately for agriculture and horticulture, upon this question, the proof of the existence of this great law of vegetation is repeated every day, and the practical farmer will not be tempted to take advantage of the pretended discoveries of these few innovators.

Eastern exposure of the orchard.

A southern exposure is not generally recommended except for the vine. The action of the sun is too powerful in the spr 's frost is still to be feared. The sap goes rapidly into circulation and the heavy frosts, which may come on, do a considerable amount of damage to the feet and roots of the trees.

The proper exposure is that suggested by the lay of the ground and the direction of the dominant winds. It is almost unnecessary to point to the damage to an orchard which may be caused by a heavy wind, to show the necessity of its establishment under shelter from such winds, or at least for the planting of one or two rows of trees to act as wind-breaks.

Here follow some opinions upon the subject

The opinion of Mr. J. C. Chapais: " In our climate a North Western exposure is the best for the following reason. Towards the end of the winter when the sun has not yet come far out of the South, where it rises in the winter, the rays of the morning sun do much harm to the frozen tree, by causing it, under the powerful rays which are met with in April, to thaw prematurately. This warm sun is then followed by heavy frosts which congeal the sap which has circulated too early, and through its expansion cause the vessels filled with the sap to burst. A piece of ground slightly sloping to the North West is free from this disadvantage. Only, as the North winds of winter are both very cold and violent, it will be well to establish a windbreak on that side."

To this Mr. Moore answer: I cannot quite agree with Mr. Chapais on the exposure of an orchard. It is true that a North Western exposure will temporally protect the trees against the sudden thaws of spring, but in the autumn the ripening of the fruit will be retarded owing to the fact that it will receive the sun's rays more obliquely and will neither ripen as well nor as early. For this reason I maintain, that to assure the life of the tree and the perfection of its fruit an exposure to the South and West is preferable with shelters to the North and East.

Owing to the importance of the subject we will also give the opinion of Mr. Dupuis. In the years 1857, 1861 and 1885, Mr. Dupuis says that orchards with an eastern exposure suffered in the same way as those with a southern or south western exposure. L'abbé Provancher instances the orchards of Ange Gardien and Beauport with a Southern exposure and those of St. Pierre les Becquets and St. Jean des Chaillons exposed towards the North which perished in 1857 and 1861. Mr. Amable Morin, a notary of St. Roch did not lose a single tree during those three years: his orchard, of fifteen or twenty acres, has neither a northern nor a southern exposure. This gentleman is of opinion that the apple trees of his confrère Mr. notary Florence Deguise of Ste. Anne Lapocatière died in the spring of 1857, owing to the water having lodged for a length of time in march at the foot of the trees, and that the ice which formed afterwards froze the roots. Mr. Morin claimed that orchards which were well drained did not suffer at all, I am of opinion, says Mr. Dupuis, that all exposures are good, provided that the land be well drained and provided that there are windbreaks to the East and West.

We agree with the opinion of Mr. Dupuis, as there are two dangers to be guarded against, the strong winds and the stagnant waters in the spring.

Manuring, liming and watering.

At the present day there is no longer any doubt of the value of manuring fruit trees to maintain their vigor, only its application must be done with judgment.

All manures are good provided they are thoroughly decomposed. The nature of the soil will point out the best to be used. It would be a mistake to put an active manure into light warm soil, which while hastening vegetation for the moment, would have the effect of causing it to become too slow at a later period. For soil of that kind, a slowly decomposing manure, such as cow dung, should be used, which furnishes the nutritive principles to the trees by degrees. For cold damp soils on the contrary the manure should be absorbed more easily by the roots so as to render vegetation more active; in such case a rapidly decomposing manure, such as horse or sheep dung, is preferred.

Rotten turf, put in the place of exhausted earth which has been removed, makes a good manure for fruit trees; but as this is not always procurable, farm manure is more generally employed; it should be made and buried before the winter. If too fresh or new it must be allowed to ferment for some time before using, as otherwise it might cause the young fibres of the roots to heat. The manure is not put exactly at the foot of the tree, but at a distance to which the roots are supposed to extend. A layer of earth is removed carefully and without uncovering or injuring the roots, the manure is then put in and covered over with the earth. It is better to manure lightly and to renew the manuring when necessary, than to put in too large a quantity at once. The tree receives greater benefit from the nourishment without stimulating vegetation, the fruit is of better quality and the flow of the sap is better regulated. Liquid manures and night soil are also employed with much advantage.

Whenever digging round the foot of the tree is necessary it must be done with the greatest care. For this tillage, instead of a spade, the use of a hoe or a fork with strong flat teeth is to be preferred, as the latter do not penetrate the soil to any depth and there is less danger of injuring the roots while at the same time they loosen the earth sufficiently to allow the air to penetrate. The ground must be broken up as often as the hardened surface requires.

Lastly a good mulching, in the summer will protect the trees from drought, especially in new plantations.

Liming is done with lime water somewhat thick and freshly made. It is good for all trees when attacked by insects which attach themselves to the bark and moss; these it effectually destroys. It is applied in the spring, during dry weather, with a special watering can (pulverisateur) before the commencement of vegetation so as not to injure the buds, the eyes or the young shoots.

It is an excellent custom which cannot be too strongly recommended in the cases above mentioned. When trees, with too great a southern aspect, appear to be drooping, a single liming is often sufficient to restore their vigor, as the white color which covers the stem diminishes the action of the sun's rays.

The lime water should be applied after having been allowed to settle for some minutes. It should only be used after it has settled.

Watering is beneficial to fruit trees during the first year of plantation if the summer is a dry one, it is equally good for the young as for the older trees.

THE APPLE TREE

The important position attained by the Canadian apple in foreign markets and the profits of the farmer who is employed in their cultivation requires us to call the particular attention of the reader to this branch of agriculture. The apple, the fruit of the North, succeeds nowhere better than in Canada, and to-day our exportations, which increase enormously from year to year, are more and more highly considered by purchaser from abroad. This year our exportation of apples will exceed one million of barrels.

The apple tree is not only the most successfully cultivated fruit tree under our climate, but it is the tree which requires the least care, fructifies the best and consequently gives the largest net profits. We cannot therefore give too much attention to its cultivation and take advantage of its profitable returns. We cannot hope to raise every kind of fruit. Those which are only succesfully cultivated as wall growers, cannot stand the severity of our winters. The apricot or the peach tree, for instance could never be made to pay. They require a milder climate, but as a set off, we have the apple, a fruit tree, most particularly adapted to our latitude. Let us profit by this fact and not allow others to carry off the handsome profits resulting from its cultivation.

The apple tree is among the most hardy of fruit trees; it succeeds well in the North As a general rule where wheat will ripen, apples also will ripen and there is nothing to prevent the growing of good apples and in large quantities in the District of Quebec and even in the Districts of the lower St. Lawrence, such as the Saguenay, Gaspé and the Bay des Chaleurs. The proof of this is before our eyes in the large wild stock which we see growing so strong and hardy every where around; wherever bad apples are grown good ones may be produced; the only thing necessary is the procuring of good stock. Further than this, experiments made at St. Joachim, at Isle aux Coudres, at St. Roch des Aulnaies, at Rivière du Loup and at the various experimental stations, have removed all doubt upon the subject.

The apple tree, with reference to its shape or the size we wish it to attain in cultivation, is divided into three classes.

1° High growth or standard trees. These are trees grafted upon stocks resulting from the sowing of the seeds of sour apples (cider apples) which generally grow to a height of 20 or 25 feet. The seed of good table fruit or sweet apples give trees of a lesser growth; (15 or 20 feet) but generally in the cultivation of to-day the results of these two productions are confounded under the name of francs and they are employed indifferently as stocks for all the trees intended for the orchard.

2° *The Doucins or half stem.* — These are trees second in height (not more than 10 or 12 feet) which are planted in small orchards or large gardens. They are obtained by grafting of stocks of the bitter apple, Malus Acerba, a wild species of small growth which is found in the forests of Europe.

3° *The Paradis or Dwarf.* — These are the smallest of their kind, not being more than 4 or 5 feet in height. The stocks for these are obtained by layers or the setting of twigs or branches of the same wild apple tree which furnishes the Doucins. Still to-day the Doucins and the Paradis, through a long continuance of a different cultivation have come to form two distinct species. A higher growth and longer roots particularly distinguish the Doucins from the Paradis.

It is unnecessary to remark that the same species may be raised indifferently upon stocks of either Paradis, Doucin or Franc: still as the first are useful as ornamental trees in a garden, they are preferred as stocks for early species or summer apples, so as to enjoy their onamental appearance as early as possible; besides they yield a larger and handsomer fruit They generally yield fruit in from 2 to 3 years after the grafting. They are also used to experiment with new kinds which have been noticed in the plantation as likely, from certain indications, to give fruit of a good quality. New varieties which are advertized each year by the nursery men are the results of these experiments.

Increase of the Apple tree.

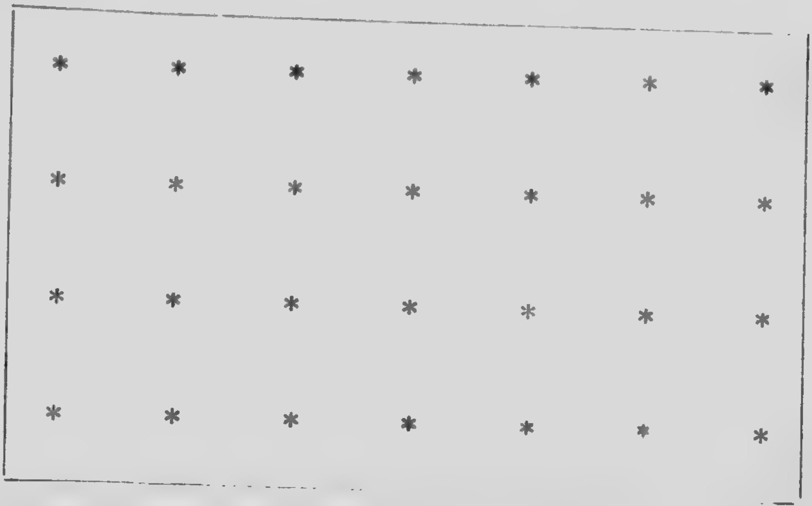
The apple tree is generally grown from a graft, as growing from seed, having a tendency to assimilate the produce to the original wild species rarely produces fruit similar to that from which the seed is taken. On this account the necessity arises of having recourse to the graft, so as to make sure of the quality we desire to reproduce. Still it sometimes does happen that the seed of choice fruit will produce fruit of a good quality. New kinds are thus obtained as mentioned above. Individual plants are also taken from the seed bed, which by a larger leaf, a more rapid growth a stronger stem or an absence of thorns, seem to give promise of something better. These are submitted to the graft and it frequently happens that new species are obtained, different from those already known, and commending themselves by some particular quality.

During the first two years of their growth they receive no particular care beyond the necessary weeding to prevent them from being lost in the grass. After their second year they are transplanted in rows, after having shortened the principal root and reduced them to a single stem if they have already thrown out lateral branches; and in the following year they are generally fit for grafting, either in scutcheon or by cleft in the neck or on the root. The graft with a scutchoen is the method most generally adopted, as it is surer, stronger and more easily performed. Still grafting on the root or by cleft in the neck are also often employed, particularly when the stocks are rather large or when earlier fruit is desired as these grafts generally give an earlier return.

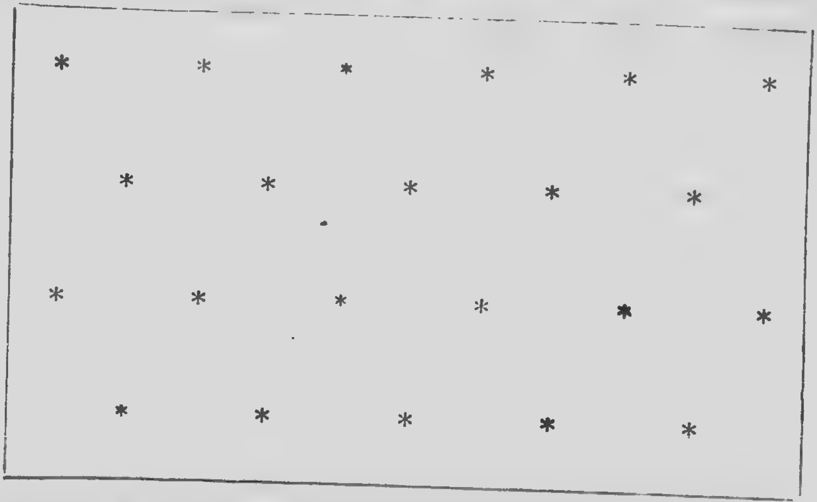
Stocks of Doucins or Paradis are procured from layers and slips as mentioned above. The plants intended for the furnishing of the layers are called parent plants. After having put down these plants in rich and very friable soil, they are cut down to withen 5 or 6 inches of the ground to force them to throw out branches as close to the ground as possible. These branches are then bent down into the ground and held in position by a small fork, the extremity being raised and upheld by a stake, and generally after a single season, these layers have taken root sufficiently to permit of their being severed or separated from the parent plant, and placed in rows in the nursery and in the year following they are fit to receive the graft. This proceeding by reducing the vigor of the tree, enables it to be kept in a dwarfed condition or of low growth. Trees grafted in the nursery during their third year, remain there for 2 or 3 years longer, until they have attained sufficient strength to allow of their being planted permanently in the orchard; and it is from that moment so to speak that their training commences, for up to that time all the attention of the grower, has been confined to the keeping of the soil clean and friable in removing superfluous branches and more particularly the lower ones to give it a bare stem for 2 or 3 feet in height, but now they must be submitted to reasonable and contiuuous pruning, if fine trees are wanted producing good early fruit and lasting for an indefinite time.

Planting.

Apple trees are taken from the nursery at the age of 4 or 5 years, they are placed in the orchard in parallel rows as below :



or angle ways as in the following figure a distance



of 20 or 30 feet is generally left in every direction between the trees.

The following table shows the number of trees which may be planted in one acre of ground, according to the space left between them.

at	5	feet	between	them	1296
"	6	"	"	"	900
"	8	"	"	"	484
"	10	"	"	"	324
"	12	"	"	"	225
"	15	"	"	"	144
"	18	"	"	"	100
"	20	"	"	"	81
"	25	"	"	"	49
"	30	"	"	"	36

The ground in which an orchard is to be planted, should first be broken up and manured in the same manner as for the production of a crop of potatoes or of Indian corn. It should in the first place be perfectly drained, as trees cannot live long in continued moisture.

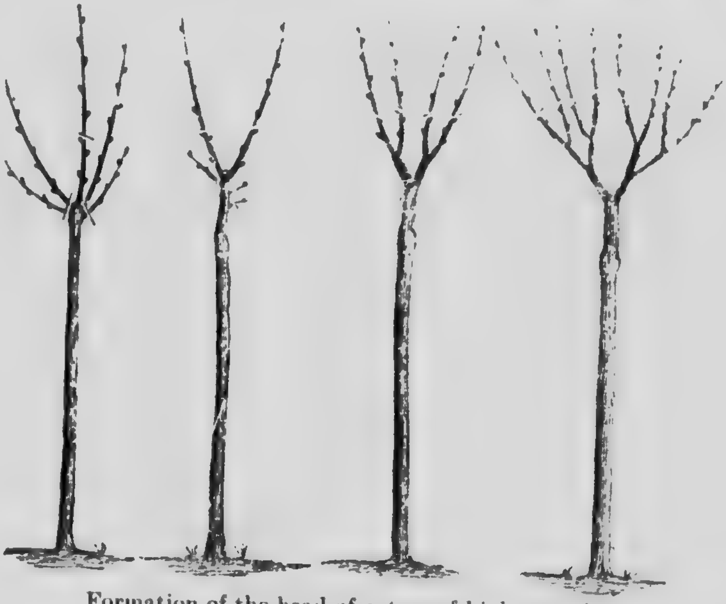
Planting.—Trees are planted either in the spring or in the autumn. In dry soil or in well drained land it is sometimes an advantage to plant in the autumn but in a general way it is better to plant in the spring, because if the rigors of winter are disastrous to the permanently planted trees they are much more so to young plants, which not being attached to the soil by new roots, cannot replace the juices of the stem when they become exhausted ; while when planted in the spring, your trees immediately commence to vegetate and allow you to judge whether the roots are in a condition to furnish sufficient juices to the plant to assure a permanent growth. I therefore declare for spring planting, but provide your trees in the autumn for the following reasons. The sap in the autumn being in a state of repose, a tree may remain 3 or 4 weeks in a packing case, without sustaining any ill effects ; while in the spring, no matter how short the time of transport, the trees will feel the heat in the packing case, will at once commence to vegetate and will exhaust the stem without having any chance to repair its losses. Order your trees in the autumn and winter them in shallow trenches in the following way if you want them to pass the winter without injury.

You dig a trench, large enough to accomodate the roots of your trees, in a dry place or in a place which is well drained and in well loosened ground, in a garden for instance. A part of one of the sides of this trench is removed and your trees are laid upon the ground in small bundles, having the roots in the trench ; you then cover the roots and the lower part of the stems with the ground which you have dug up and by bringing more ground if required, so that there will be at least 12 inches of ground above the roots. You will then add a board or some sapin branches over the stems to retain them in position so that the snow will cover them completely over. By this means you will be assured that your trees will not suffer in any way during the rigors of winter. You will even see them growing in the spring to the terminal eye of every shoot ; and whenever your ground is ready to receive them, you will have them ready to hand, to plant at the proper time.

Having, with a cord and measure, laid out the place for each tree, you will dig a hole, at the place, of 3 or 4 feet in diameter and of 2 to 2½ feet in depth. But before placing your tree you must proceed to dress it, that is to prune it in such a manner as to reestablish the equilibrium between the head which has remained perfect and the roots which have been more or less damaged. Only 3 or 4 of the principal branches should be left at the head, the others being taken off, the stumps of former prunings and all damaged branches, &c., must also be cut off. You will also shorten each branch to the 4th or 5th eye from its base according to its strength and to the form which you wish to give to your tree. You will also examine the roots and cut clean off any that have been injured in the bark or torn while being taken up and especially those which show any signs of disease. After having thrown a few shovels full of earth into the hole to bring it to the height necessary for the roots of your tree, you fix it in the line which you wish to keep and while an assistant holds it by the head, you spread out all the roots in their natural positions and you continue to fill up the hole taking care that the earth perfectly fills the interstices between the roots, pressing it down lightly with the foot for this purpose and watching that clods of earth do not form vacancies and prevent the roots from everywhere being in contact with the ground. (*See page 17 and following*).

Should your ground not be rich enough, you must mix some garden mould or rotten dung with the earth with which you are filling the hole; the rubbish found round dwellings, in which are mixed ashes, coals, pieces of leather, bones and other things may also be used but not fresh manure. You then fit your tree with a good stake or picket to prevent its disturbance either by the wind or snow, being careful that the bandage or fastening used does not injure the tree. When the ground in which you are planting is too dry, watering should be done during the planting and before the hole is entirely filled. When the planting is done in the autumn it is better to put off the pruning of the branches till the spring, it will then be easier to judge of the injuries they may have received from the frosts of the winter. It is well in the autumn to raise up the branches if they are weak and to bind them with good strong twine so that the weight of the snow will not break them off near the stem.

Once your trees are in position, if you wish to see them grow vigorously, the soil must be always kept clean and loose so as not to interfere with evaporation and to facilitate the admission of the air and there is no better way of effecting this than by the cultivation in the orchard itself of crops requiring the use of the hoe such has potatoes, turnips carrots, cabbages, beans &c. There is nothing either to prevent putting in grain especially during the first year. If from the beginning you leave it in grass, you must be careful not to allow the sod to get nearer than 3 or 4 feet to the foot of the tree, and for this purpose this space must be dug up at least once every summer and manure placed upon at least every two years. With these precautions you will see your trees prosper, grow vigorously, form solid frames, and be proof against the accidents and diseases which are so fatal to young trees when they do not receive proper care. They must be pruned and pinched every year, the lower part of the stem must be kept bare, all suckers and shoots being destroyed the instant of their appearance. After the fourth year your trees will be giving fruit and about the 10th or



Formation of the head of a tree of high growth.

12th year they will be in full bearing, that is to say that taking them one with another you will be able to count on a crop of 7 or 8 bushels to a tree. Trees have been known to yield up to 25, 30 and even 40 bushels, but when in an orchard 7 or 8 bushels can be counted on it is certainly a most paying production.

Pruning the Apple tree.

After the first year's growth of the graft, your tree will only show one shoot of 2 or 3 feet in height without lateral branches, or if any, only 2 or 3 at the top (fig. 57).

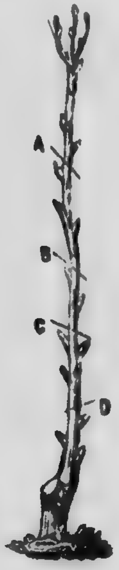


Fig. 57.

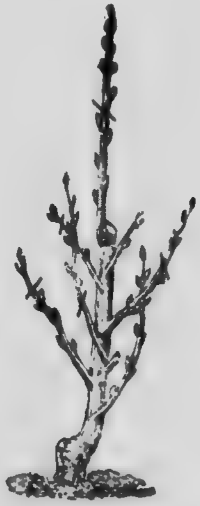


Fig. 58.

In the month of April or May you cut down this stem to within 10 or 12 inches of the ground, cutting diagonally across, B or C; you should only allow 4 or 5 eyes to remain and these should be near the top, all the others should be taken off. The diagonal line at A marks the spot where the the amputation should be made 2 or 3 feet above the ground.

if you intend to grow a standard tree, and that at D, 5 or 6 inches above the graft, the place for a similar amputation if a dwarf tree is required. About the month of June the higher lateral shoots should be pinched so as to drive back the sap to the lower ones which are to form the base. A tree treated in this way, if it has a strong healthy stem should have the appearance of that shown in figure 58.

2nd year.—The 4 or 5 lower branches are selected to form the base, the two lowest are cut off at the 5th or 6th eye and the 2 or 3 others at the 3rd or 4th eye from the pruning of the preceding year as shown by the diagonal lines in figure 58, in such a way that your tree will already show the form which you have chosen. The bowl shape is generally chosen.

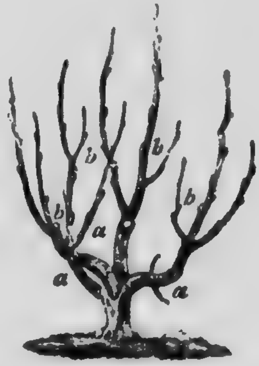


Fig. 59.

3rd year.—At the end of the third season, except that it will have thrown out 4 or 5 new branches, your tree will have lengthened each of its older branches as well as the stem as shown in figure 59 ; the letter *a* showing the pruning of the 2nd year and *b* that of the last spring. Always working on the same lines, you shorten all the new shoots in such a manner as to preserve the intended form of the tree. After this year, twigs will spring from the lower branches and these twigs almost always produce fruit the year following. The tree should always be watched during the season of vegetation and such shoots as are growing too vigorously and are liable to spoil the symmetry of the tree must be pinched. This same course should be followed each year adding 4 or 5 new branches each season and 6 to 8 inches to the stem until your tree has reached its full bearing, after which there will be nothing to do but to remove the dead wood, to reduce a few of the shoots, as may be growing too rapidly and to encourage such as may be weak, so as always to preserve the form of your tree whether bowl shaped or pyramidal the latter form being always chosen when the space for planting is limited.

Varieties of Apples

The catalogues of all the nursery men in Canada and the United States show at least 1000 varieties of apple. It is certainly no easy matter for an inexperienced grower to make his selection from such a number. To trace the history and description of each of these varieties would require a volume very much larger than the present one. We will only mention here such varieties as have been proved to be likely to succeed in our climate and are to be recommended for certain particular qualities, so as to enlighten the reader as to the selection he should make or at least to give him the opportunity of judging of the merits of the fruit he may intend to grow.

There is every object in increasing the quality of the fruit but the weight of the produce should be preferred to the number of the fruit: for the manufacture of liquors, trees with small fruit are both more fertile and more reliable and they continue longer in fruit: further, from a smaller fruit the juice is generally sweeter and of a greater aroma and likely to furnish a liquor stronger in alcohol. In apples a bitter and somewhat sweet fruit is preferred it gives a rich coloured cider with strength and good keeping qualities; acid varieties should not be used, for although they yield large quantities of cider, it is weak in alcohol and liable to turn black Moderate sized fruit of handsome shape and rich colouring are the best for table apples or pears or for orchard fruit intended for the market, deep green colours are not in such request. As quality is not always the first consideration in selling, varieties, with firm flesh, of good shape and a peel not liable to spot or turn black, should be chosen.

Apples are generally divided into three classes, summer apples, autumn apples and winter apples The first are those which ripen before all others from the end of August to the month of October; these usually will not keep more than one or two months. The second are those which ripen in October and will generally not keep longer than the month of December. Finally the third class or winter apple ripens from October to December and often keeps until the following June or July.

From experiments made at the Experimental stations and by horticultural societies the following species and varieties appear to be the most hardy and valuable.

The Red Astracan.—A fine fruit of agreable flavour, profitable to cultivate owing to its ready sale at the beginning of the season.

The Alexander.—Very large and fine and much enquired for in our climate. Both the Alexander and the Astracan require a rich fresh soil.

The Duchess (of Oldenburg). — Large and fine, growing well everywhere and producing enormously.

The Yellow Transparent (from Russia) — Large and fine, producing 2 or 3 years after grafting; the tree is vigorous and very productive and should, together with the Duchesse and the Wealthy, hold first place in the family orchard or in plantations for commercial purposes.

The Wealthy. - A handsome and well keeping apple resembling the Fameuse, one of the most productive.

The Golden Russet. — A good keeping apple, hardy and productive.

Peach of Montreal. — An excellent apple and valuable for a near market. This tree resists the heavy frosts.

Scott's Winter.— Good until June, a good exporting apple.

The Wolfe River. — As large and handsome as the Alexander and of better flavour, a strong and fertile tree.

The Longfield.--A keeping apple, an early producer and very fertile.

The Tetofsky (of Russia) A good apple, ripe in August it produces largely every second year.

The Arkansas' Beauty.—A handsome keeping apple. The tree is highly thought of in the Eastern Townships.

The Titorka —A large handsome autumn apple. The tree is both very hardy and productive.

The Haas.—Fruit of medium size, red and pale yellow, flesh white, tender and juicy, and slightly acid. The tree is exceedingly vigorous and hardy, ripens from september to november.

The Canada Baldwin.--Fruit of medium size, the peel is smooth, yellow streaked with carmine and crimson, dotted with large points, the flesh is white, often shaded with pink. is firm and juicy, somewhat tart, with a slightly astringent taste peculiar but not disagreable. It is a mid winter apple but not later. The tree is vigorous and hardy and succeeds well in a clayey silicious soil.

The Ben Davis—A large round fruit, slightly conical, pale yellow tinged with a golden red, flesh white, juicy and slightly acid, quality medium. The facility with which it retains its beautiful appearance until the spring, makes it a most precious fruit for the English market where it brings very high prices. The tree is both strong and hardy.

The Mann.—Size above the average, colour green with patches of black spots, but becoming a deep yellow when perfectly ripe ; of exquisite taste and an aroma which make it one of the choicest of apples. The tree is strong and hardy and the fruit keeps until April.

The Red MacIntosh —Size above the average, round and slightly flattened at the poles, of a deep red all round. The flesh is white, juicy and of exquisite flavour and aroma. The tree is strong, hardy and produces abundantly. The fruit keeps from November to February.

The Pewaukee. — Medium size, slightly conical, peel bright yellow, aroma good. Its keeping qualities make it a first class fruit for exportation. The tree is vigorous and grows well everywhere. It commences to bear somewhat late but gives an excellent harvest.

The Pomme Grise.—The fruit is small, reddish gray in colour, the flesh tender and aromatic. The tree is vigorous but is only grown successfully in the South and West.

The Quebec Winter.—Medium size, colour yellow with red spots, of agreable flavour, this variety is highly recommended, the tree is strong and hardy.

The Roxbury Russet.—Size above the average; colour dark green with patches of a brownish yellow; flesh greenish white, not juicy but of a pleasant taste. The tree is a strong grower.

The Salome.—Average sized fruit, shape conical, the skin yellow with a reddish tint in the sun, the flesh is a pale yellow, is juicy and of an agreable flavour. The fruit keeps easily till June; the tree is strong and hardy.

To those who only wish to plant a few trees Mr. Dupuis recommends the following varieties:

The Duchess,
The Yellow Transparent,
The Wealthy,
The Red Astracan,
The Fameuse,
The Scott's Winter.

Among the keeping apples the "Reine des Reinettes" deserves special mention. It is larger than the Golden Russet and may be kept until February and March. It is a good apple for exportation.

The fruit is well rounded, the colour pink with red lines on a cream or straw coloured ground. Its flesh is smooth fairly firm, tinted, somewhat tender, sweet and aromatic and is well flavoured.

The tree, which stands the cold better than the "Reinette of Canada" is a superior tree in every respect both from its regular form and from its great fertility. It gives a fine and good family fruit, equally good for the kitchen or the market.

Other varieties which promise well :

La Calville : St. Sauveur : is large and good and ripens in January. The tree is hardy, fruitful and an early bearer.

La Calville : (des femmes) is a good winter apple, large, green with flesh tints. The tree is fruitful and should be increased and spread over the Eastern part of the Province.

The Transparente de Croncels, although smaller than the Yellow Transparent, is a good summer apple.

We also recommend the Northern Spy. It is one of the finest and best apples that can be produced. Mr. Whitcomb's opinion is that it [illegible] not its equal in the market. As a fact it is much sought after and always brings good prices.

THE PEAR TREE

The Pear tree in much more difficult to acclimate than the apple and while almost every kind of apple grows well in our climate, the pear tree on the contrary gives but few hardy specimens. Late experiments show that their number is increasing and that by judicious selection, we may succeed in obtaining good and numerous varieties. Later we shall see the kinds that have been succesful even to the east of Quebec; but this is another occasion in which the advice may be repeated and it is of the greatest importance. " Buy nothing " from the nursery man that has not been perfectly acclimated. "

The pear tree has tap roots, it therefore requires deeper ground than the apple. It also requires most imperatively the assistance of the pruning hook to bring on the production of fruit, as, left to itself, it might grow for a long time without producing any fruit at all.

Pruning the pear tree.

We do not advise the raising of pear trees from seed, it is better to buy them from reliable, nursery men and in your own region if possible. The trees will have a better growth and will be less liable to continue stunted and unproductive. Still, although the importation from a temperate to a rigorous climate is dangerous, the inverse is far from being equally bad, as the tree under more favorable conditions of temperature, will become more vigorous.

The pear tree may be allowed to retain its natural form while at the same time it is submitted to the operations of pruning. We would recommend the pyramidal form for gardens, if the tree itself does not tend that way.

The pruning of the pyramid will be the subject of the following observations.

The first pruning after transplanting.

This pruning should be carefully considered, because if not properly done, it will be difficult to restore the tree later on. If properly done, although later the tree may fall into the hands of an inexperienced gardener, it will still retain a correct base.

The tree will show the qualities or defects given to it in the nursery by its particular manner of growth and management. Trees are seen which are either too high or too low, furnished or bare of branches or fruit branches If all its branches were allowed to remain upon the tree, there would be too many of them (fig. 60).

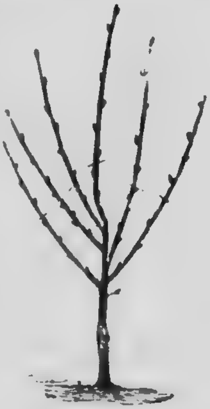


Fig. 60.

Choice of the head. — The first thing to be seen to, is whether the tree has a good head, whether this head is badly formed or too high and whether in such case it is not possible to fall back upon a branch well situated and placed so as to continue the stem. After the head has been chosen, you examine whether it is possible to for the first story at the proper height with three or four branches of as nearly equal strength as possible (1). The remaining branches are then cut off (fig. 61).

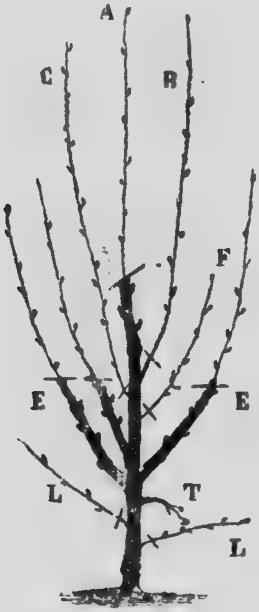


Fig. 61.

Often the terminal branch is not the best, it may be weak, or if strong it may be accompanied by one or two secondary branches growing from its base, which secondary branches being necessarily removed, leave wounds at the base of the head or top branch. In such case the strongest branch below is taken to form a head, this has the further advantage of diminishing the height of the stem. Should

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1—Ferny says : " This number of 3 or 4 branches would appear to be a great reduction if we compare trees from a nursery treated in this way, with those described in certain treatises on arboriculture and which are shown with twelve branches ? starting from the graft up [illegible] the head for the first story of the tree. We remember that, in our earliest experience, when we had left 6 or 7 branches on a young tree of 2 years old, we were later on forced into most vexatious prunings, even in the most fertile soil.

this branch, now become the head, have too great an incline, it should be pruned at an eye above to render the bend less acute, if it cannot be straightened by a prop.

The head must not be cut down to a lateral branch unless for some special advantage, as it will make a bad wound on the stem.

The head should be pruned very short, because if pruned long, the sap will not concentrate on the first range of branches. There is no question of obtaining a second range during the first year of planting, which besides would be difficult, the proper building up of the first range is quite sufficient.

Choosing the first range. There are generally 5 or 6 lateral branches, often less which come after the head. Next to the head a strong branch B is found, it is generally vertical and of equal strength with the stem. This branch being more inclined to become a stem than a branch if formed into a branch, will be too strong and will derange the equilibrium of the frame. This strong branch should be cut off close to the stem unless the absence of other branches necessitates its preservation ; in such case it should be pruned very short, to 4 inches, to weaken the branch which it will form.

Sometimes, especially on the Valencia pear, this second branch is formed from a small branch which the nursery-man has neglected to remove from its base. An enormous base has formed on this little branch supporting three branches coming from the same base. This triple branch should not be used to form a branch, it should be cut off, even if by doing so a bare place is created.

Next to the head, two or three branches, often of the strongest B, C, F, are found but in a wrong position to form the first range. If good branches E, E, in sufficient numbers to form the first range, have been chosen lower down, those above should be cut off, close to the stem. If allowed to remain they would form too strong branches and in a bad position which would ruin the first range below them. These strong branches occupy a space of 4 or 5 inches between the the head and the first range. If the space left bare by their removal is longer, an extra branch F pruned to 4 inches is allowed to remain to fill the void.

Three branches are enough to form a range. It is only on a strong tree well furnished with branches, or where the head is far from the range that a fourth branch is left By leaving a greater number the extra branches will be weak and the sap will abandon them which would compel their removal at a later date.

The three selected branches should all start as near as possible at the same level, that is to say they should follow each other and be placed at equal distances on the circumference of the stem.

The selected branches should start singly from the stem if two branches start from the same base, the weaker one should be cut off.

Pruning the first range — The first range of branches E. E. should be pruned rather long so that it may compete with the head. The first branch to 7 inches, the second to 6 inches and the third from the top to 4 inches; if there is a fourth branch F which is generally stronger than the others, it should be pruned to 3 inches. (see Fig. 61.)

If a branch is too strong in proportion to the others, it should be pruned shorter still. By this pruning the extremities of these branches will be at the same level, an essential condition that they may be of equal strength. Longer or shorter prunings would weaken the range.

These future branches are not always of the right nor of equal strength; notching reestablishes the equilibrium. The last branch at the foot should always be notched and a second notch should be made on the weakest branch

The branches are straightened and if raised too high, they are bent down. If the three branches are on the same side of the tree, two are brought round to the opposite side by bending a strong piece of wood across the stem and the branches are separated from one another by a piece of wood having the ends beveled.

A branch, partly broken during the planting, must be cut off at the base if the break is a bad one. If there is hope of saving it, the broken part is enclosed in wooden splints. The following year it will not show, if there is any roughness it is smoothed off with the pruning hook.

Baring the stem.—Once the range is formed every thing growing upon the stem from the ground to the height of the range LL., must be removed, although there may be some strong branches among them The branches growing low on the stem are neither fertile nor lasting and prevent the sap from penetrating the stem.

Imperfect or badly formed nursery trees.—During the first year of the plantation very imperfect trees must not receive a complete pruning. The stem and the longer branches may be cut down to one half of their length, so that the following year there will be old wood to work upon. The tree having taken root, a full pruning may then be done and strong well formed trees be obtained. It has become the custom for some time past not to prune pear trees at all during the first year after planting. The custom is a good one for badly formed trees or trees that have been planted too late; for others it is better to prune during the first year. It is true there is the risk of obtaining weak shoots during that year, but this is no great drawback if the pruning is done short the following year for then the tree, having taken root, developes a sure and vigorous growth.

Pruning during the first year has the great advantage of causing fruit branches to show along the branches which are left on the tree. These fruit branches after the second year, show a fine fructification which we would not have had, if the pruning had only been done during the second year. On a tree which has not been pruned during the first year, the pruning must be done the year following on eyes of two years old wood, and these eyes only grow slowly and under compulsion. Besides this, often only one small branch grows at the end of each branch, the rest of the branch being perfectly bare, which keeps the tree back in giving fruit.

Unfortunately many badly formed trees are received from the nursery ; to prune them properly requires both skill and experience and is of the utmost importance, since upon the first pruning depends entirely the beauty of the tree ; later it will be impossible to alter its shape which can only be done while it is young. There is no necessity to be afraid of defects of form which appear in some young trees. They are then so easily managed, nature has so many resources, that by the methods we have indicated there need be no doubt of producing properly formed trees. Only, in some cases, things must not be done too hurriedly ; it is better to obtain, what is required, by time and moderation than by a too rapid exercise of power, provided always that the trees themselves present resources for us to work upon, such for instance as a certain number of branches of which we can make use. When there is nothing good about the tree but the stem, strong methods are necessary, the tree must be pruned " en chandelle " clear of every thing, but this work must be put off to the second year and sometimes even to the third or fourth.

A badly formed tree of two years old.—Occasionally it happens that a young tree has only sprouted on one side, sometimes only a single branch with either nothing at all on the other side or nothing but fruit branches It is impossible to reform this tree by preserving the single branch, every thing must be cut off; otherwise no matter what is done, the tree will always be too strong on one side; it must be pruned bare (fig. 63): that is there must be nothing left but the stem, and the tree will give a number of fine branches which will form a regular and handsome new frame.

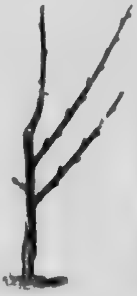


Fig. 62.

Fig. 63.

A tree having only two branches, one on each side to form the first range. A third branch is wanting to complete the range, but this may be procured later. If there is a twig growing in the place where the third branch should be, it is cut off and with the assistance of a notch a branch is made to grow from the supplementary eyes.

If the two branches should be on the same side (fig. 62) they may be forced apart by a piece of wood so as put them opposite one another

A badly formed tree of three years old.—If it has been carefully planted, it is pruned the first year; but if it has been injured in any way, then only the second (fig. 64).

The first range of lower branches is weak and has some vacancies, or else the places of some of the branches are taken up by fruit branches. At the upper part, on the two year wood, strong branches have grown, the head is sometimes very strong, but often it has disappeared, or is small and puny, the branches below having outgrown it. The vegetation of this tree is the opposite of what it should be; the strong branches being near the top instead of near the foot of the tree.

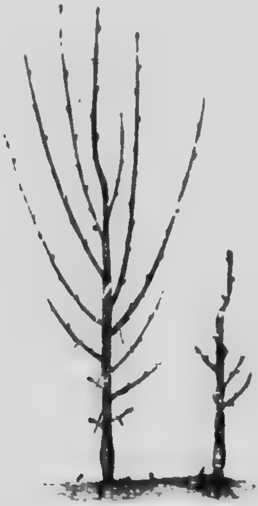


Fig. 64.

The few lower branches, although weak, must be taken advantage of to form the first range; as to the range of strong branches above, they must be all cut off. If a single one of these strong branches were left, the tree would become a failure, its base would be weak and bare. It must also be reduced in height by the formation of a new head from a lower branch.

Second pruning after transplanting.

If the tree has grown well it will have the appearance of fig. 65, if the vegetation has been less vigorous it will appear as in fig. 66.

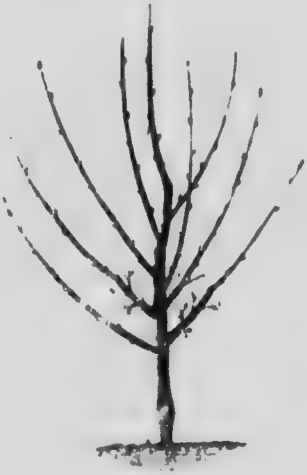


Fig. 65.

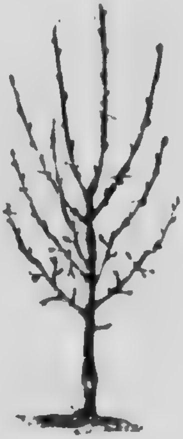


Fig. 66.

The second year, the tree having taken root, it must be pruned very short so as to obtain wood.

The base of the tree must be well formed before there is any attempt to obtain fruit. The head is pruned to a length of 8 or 9 inches, according to its strength, but never longer, so as to obtain a third tier of branches. The branches are pruned very short, to three inches in length, and always on a wood eye, as in the year of planting, the growth is not strong. If only flower buds are found at the end of the young branches we come back to an eye only slightly developed, found on the two years old wood, which however must not be too close to an elbow. If there is only a fruit branch in the place of a branch, a notch should be cut at its base, so that the secondary eyes will throw out wood and a new branch be obtained.

Notches should also be made on weak branches but not too many of them (two or three on a tree, never more). Every thing weak, twisted or withered should be removed as much as possible. There should be no hesitation and there will be no after regrets at the severe pruning of the young trees during the first years after planting.

In the summer worthless branches are allowed to remain, their removal would interfere with the growth of the young tree. These lateral branches should be cut very short during the next pruning, except the weakest which might suffer from breaking during the winter.

Third and fourth pruning (fig. 67).

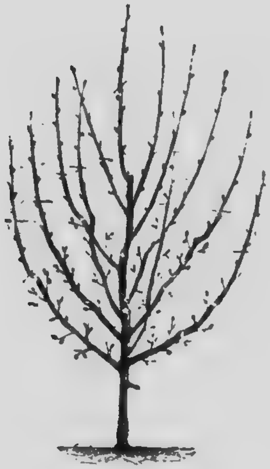


Fig. 67.

By the short pruning of the preceding years, a vigorous growth has been secured with branches terminating in strong wood : if during this pruning some of the branches are seen to be weak and ending in fruit branches, they should be pruned at a wood eye, straightened and set up more vertically and if necessary notched at the base

The head is pruned to 7 or 8 inches and the branches sufficiently long to cause them to fruit. There must not be too many of them. The less branches there are, the more fertile will be the tree and the fruit large and fine, still three or four extra ones may be allowed to remain during the youth of the tree, to be taken off later.

The branches should be placed as the steps of stairs and never one immediately above the other.

If there should be too large a vacancy on a tree, instead of attempting to obtain a new branch which is always weaker, it is better to spread the neighbouring branches to fill up the void Branches requiring it should be straightened, or they should be spread by means of fastenings or pieces of wood, bow-shaped, placed against the stem or the other branches. Up to the present time the young pyramid has had its branches raised so as to strengthen the first branches at the base. At the 4th pruning the tree is opened out by lowering the branches to an angle of 45 degrees; if the branches were allowed to remain raised the tree would become like an Italian poplar and would be unfruitful. During vegetation useless branches are cut off. The bases of the first branches commence to fructify during this year.

Fifth Pruning (fig. 68).

We commence by pruning somewhat short the branches at the base which are then half formed, so as not to exhaust them by giving them too much spread. The head is pruned to a length of 10 inches, rarely more, to avoid vacancies on the stem. Still it is sometimes left as long as 15 inches on natural fruit trees which are very vigorous and furnished with numerous and strong branches and aged from seven to eight years.

Advantage should be taken of the strong growth of a tree by increasing its height to fit it for fructification. The following years the base of the tree is but slightly enlarged and

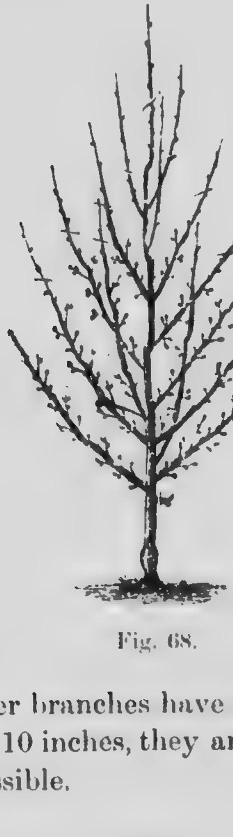


Fig. 68.

as fast as the lower branches have attained a given length of about 1 yard and 10 inches, they are not allowed to lengthen any further if possible.

When the tree is formed and has reached its eighth year it is stopped, unless it shows remarkable strength, that is to say that the branches should be pruned every year on a good eye at 3 inches and the head at 4. We should not seek to heighten the tree, it should not gain more than one new tier of branches in two years. Sometimes indeed if the last tier of branches is weak or badly formed, the stem is cut down to the older wood, provided the latter is not larger than the thumb and the weak branches are cut off at the base so as to form a new and strong terminal tier. Once the pyramid is formed, there should be no attempt to increase the number of its branches, nor their lengths , and by degrees especially when the tree begins to be exhausted, the branches are thinned and their number reduced, so that they may receive the necessary sap and light (fig. 69).

Low sized pyramid.

The lofty pyramid is particularly suitable for well kept gardens with in narrow borders, and well protected against

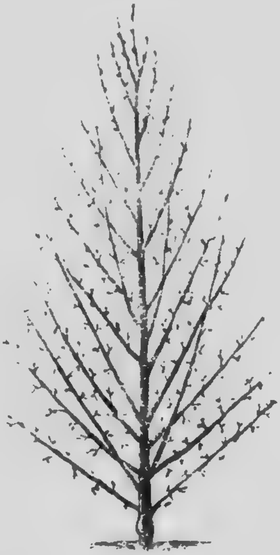


Fig. 69.

bad weather ; for in such places it is not possible to enlarge the body of the trees without being cramped by the paths and deranging the plantation ; but when the plantation is made in borders of a certain size or in squares with trees of shorter growth and if the soil is not over fertile and the shelter poor, it will be wise to keep to the law pyramid, if production is the main object, particularly for the market.

The low pyramid is stopped at a height of about 5 feet and grows very little afterwards ; the object is to concentrate the sap in the lower branches, which will by this means become better developed ; they will be more spreading, rather more numerous and some what nearer one another on the stem than in the ordinarary pyramid, while still being far enough apart. These lower branches will naturally become longer without long pruning which would weaken them, for they should and most generally do support themselves.

These trees will be managed in the same way as the ordinary pyramid during the first years, except that they will be allowed to retain a few more branches and that the heads, will be kept shorter. Once it has reached a height of 10 feet, no new branches are formed and the head becomes a branch. It is true there is the risk of sometimes destroying the stem by allowing the branches to overtop it but this danger may be avoided by a careful pruning of all the parts.

When the pyramid is furnished with the requisite number of branches, no others are allowed to grow and there is nothing further to do but to prune the ends of the permanent branches, which, absorbing all the sap, continue in a perfect condition of vegetation and fructification, if they are only slightly raised and kept furnished with good and strong fruit branches. There should be no attempt to form them into bowl shapes : The branches should be kept well apart from one another ; being already as long as necessary.

Trees managed in this way often give fine fruit but on condition that they have plenty of room.

Pear trees require a deep rich soil, they should be planted, says Mr. Baltet, in fresh localities on sunny rising ground, in narrow passes where air and heat concentrate, in plains sufficiently elevated to be free from stagnant moisture but not so high as to expose the trees to cold air currents or sudden and violent storms. Sheltered localities are the most favorable for the pear tree.

The following are the species which experience allows us to recommend up to the present, while waiting the results of experiments with many new varieties.

The Flemish Beauty (Fondante des Bois). — Grown both here and in the United States. It is very fertile whether grown naturally or grafted on the quince. A September pear, large, handsome and good.

The Foukouba. — A Franco-Japanese tree of extraordinary vigor and fertility. Fruit large, red spotted, flesh firm and breaking ; it is an excellent fruit for preserves, &c. It suits the most rigorous climate.

The Anne de Bretagne. — Medium size, richly colored ripe in november. A tree of 1901 has already given fruit.

The Barillet Deschamps. — A very fertile tree, the fruit was small in 1902, matures in January.

The Bergamoth Hertrich. — Fruit average, good for winter.

The Beurré d'Amanler.—A strong and very vigorous tree, very productive, large fruit, good in October. Mr. Baltet calls it a valuable variety in every respect.

The Bonne Serre St. Denis.—Has produced pears of the size of the Favorite Clapp. This is a preserving pear.

The Henri de Bourbon.—A very productive tree, fruit good and fairly large, matures in November and December.

THE PLUM TREE

The Plum tree has a root running close to the surface and not penetrating the soil to any depth. The best ground for the plum tree is a good, light, fresh and somewhat moist soil without being marshy or having too much clay or sand in its composition. As a rule it stands moisture, better than drought. With our wild plum tree as a stock, plums may be grown in many places where their cultivation was former by considered impossible. Many intelligent horticulturists in the northern parts of the United States, after having vainly attempted the cultivation of plums for many years have succeeded in obtaining good and fine fruit by means of this graft. It has the particular advantage of growing well in the least favored soils and of resisting the dryness of light soils better than any other kind.

It is astonishing that in Districts in which our wild plum is so abundant and vigorous and where blue and white plums are scarcely known ; it is astonishing I repeat that no attempt has been made, long since, to graft the latter on to this wild species. And now to-day, when success is no longer doubtful our intelligent amateurs and practical horticulturists should at once set themselves to the work. To assure success, a large quantity of the stones of the wild plum should be sown in good ground and by the following year the roots will be strong enough to receive the grafts. For this same purpose, the roots of the large number of small plum trees to be found almost always under the old trees may also be employed; these, it is true are often shoots from the roots of the old tree, but they are also often the natural tree growing from the stones which have dropped there at the time of the maturity of the fruit.

Pruning the Plum tree.

Plum trees are generally removed from the nursery after the second year. In an orchard there should be a space of 10 or 15 feet in every direction between the trees whether placed in straight lines or at angles from one another; dwarfs which are planted in gardens may be planted as close as 6 or 8 feet. The same care should be taken in their planting as in the case of the apple; every precaution should be taken to prevent injuring the roots.

In standard trees 3 or 4 feet of the stem is left bare and during the first years they are pruned like the apple, shortening the shoots that have become too long and removing branches where too thick, &c. Branching out should also be prevented except by three or four principal branches.

Dwarfs, intend for the garden, may be easily given the pyramidal form, but in any case they should never have a stem of more than 1½ to 2 feet in length.

The Plum tree which grows vigorously during its early years, requires assiduous attention, to maintain the equilibrium between the various parts by pinching and to prevent the secondary branches from overtopping the main stem, when a pyramidal form is required.

Plum trees, more than all others and especially in damp ground, throw out a number of branches called gluttons, which grow so rapidly that they soon surpass all the others and in a short time finish up by causing the destruction of part if not of the whole of the tree. This fault is remedied by pinching during growth. These gluttons are almost always the result of bad pruning or of its total omission. It is an invariable rule and without an exception, that in spring pruning, the young shoots, which have suffered from the winter frosts, must be cut down until sound wood is reached, as otherwise the flow of the sap, being unable to spread easily through the injured vessels of the wounded extremities which have been left, will make its way to an eye lower on the stem and will form one of those glutton shoots which will attract to itself almost all the sap and allow the others, especially the eyes situated above it, to vegetate weakly or even to dry up and die. A slight looking over your trees in the spring will show you at once the mistakes of the preceding pruning. Wherever you have pruned to sound wood the branch will have continued by an eye placed lower down, leaving a stub either already dried up or else with a large bud at the end which will however never come to anything and which must be cut off without hesitation.

Plum trees give their fruit on wood of two years old or more, and once the tree is in bearing, there is nothing more to be done besides the removal of dead wood and the pinching of too quickly growing branches. Plum trees generally commence to bear the 4th or 5th year after grafting. Sometimes the trees suffer from carpomanie, which means that they are loaded with an overabundance of fruit, which often destroys the tree unless a portion of such excess is taken off.

As it is always well to be guided by the results of experience, we cannot do better than borrow from Mr. Auguste Dupuis, Director of the experimental fruit stations, the valuable information furnished by him in his report. The cultivator will thus be able better to judge of the qualities and defects of each of the species of plums therein mentioned.

Qualities and defects of some varieties of Plum trees in the orchard and nursery since 1860 at the Fruit Station of the "Village des Aulnaies".

Albany or Hudson River Purple : My first trees died during the winter of 1896-97 ; the roots froze owing to want of protection and drainage , the young ones are fine ; fertile variety, very large blue fruit.

Bradshaw : 2 trees planted in 1860 died in 1896-97 ; the 10 years old trees bear little ; large, handsome, good blue fruit.

Native Blue Damson : Well known, hardy tree, productive, delicious fruit. We should strive to preserve this species.

Fellemberg : Too tender for extensive culture.

Guii : Very productive variety, fruit large and finds ready sale.

General Hand : Tree tender here.

Grand Duke : A vigorous tree, crop abundant, 1900, 1901, superabundant, 1902, fruit among the largest and finest.

Coe's Golden Drop : abundant bearer, fruit ripens late in October, this plum can be kept, like the Grand Duke, into December in a shed or cold cellar.

Lombard : very hardy, bears young, and enormously ; a handsome, good plum for the market.

Moore's Arctic : comes into bearing very young ; a little less vigorous ; but with stronger wood than the Lombard ; very productive, a fine plum for the market.

Monroe : thus far this vigorous and hardy tree has yielded little.

LcLaughlin : a delicious fruit.

Niagara : similar to the Bradshaw.

Native Orleans or Large Blue Imperial : on the tall ungrafted tree the fruit comes very large, lives long, but produces less than the Damson.

Smith's Orleans : deserves a place in the amateur's garden.

German Prune is not a marketable plum.

Pond's Seedling : Hardy to the cold, tall, producing one of the finest and largest plums known for keeping.

Quackenboss : Vigorous and very productive tree, fine market plum.

Reine Claude Montmorency Blanche : native in the natural state, takes first rank for quality and profit.

Reine Claude Imperiale : (Imperial Gage), excellent fruit, tree delicate.

St Cloud : Nice plum similar to Quackenboss.

Shipper's Pride : Excellent for the market, a profitable tree.

Washington : Hardy, fruit very large and yellowish green, as handsome as a peach on the tree, commands the highest prices.

Yellow Egg : Productive, large fruit. autumn.

Jones' Seedling : Very vigorous, tall tree. Ten and twelve years' trees have not yet fruited, either here or in the surrounding orchards.

St Laurent : tree a little tender, fruit delicious, blossoms and buds sensitive to the cold.

Amaryllis : A seedling of Mirabelle 1890 by A. Dupuis, in bearing since 1896, fine large white plum, highly appreciated by Dr. W. Saunders, manager of the Experimental Farm. Tree very strong and vigorous, as well as the suckers.

Abundance, Burbank, Simoni, Satsuma : These four Japanese varieties are too tender ; the trees freeze the moment they rise above the bed of snow. Agents have sold thousands of these Japanese plum trees in our rural districts at 75 cts and $1.00 each and these trees are all dead.

Packing and canning Plums.

Guided by the examples of the California fruit-growers, I pecked my plums this year in pasteboard boxes of a quart each. This packing was appreciated by the retail trade and my best customers.

These small boxes placed in open-work cases of 4 gallons kept the plums well, even when transported to great distances, such as Ottawa, the Bay des Chaleurs, Gaspé, &c.

In 1902, for the first time, L'Islet county plums were canned. Mr. Charles Peloquin, M. C. A, and manufacturer of canned fruits at St. Hyacinthe, came with your authorization in September last to St. Jean Port Joli to deliver a most instructive lecture on apiculture, tomato culture, and the mode of preserving them in cans for family use and for the market.

Taking advantage of his visit to the county, Mr. Peloquin came to the fruit station and tried to can our plums. He thoroughly succeeded.

The grocers, to whom he presented samples, admitted that they were as good as the imported plums. He obtained $1.44 per dozen boxes. It required a gallon and a quarter of fresh plums to make a dozen cans; the plums thus employed yielded a higher price than those sold on the market.

Encouraged by the success of his first attempt, Mr. Peloquin called for 6 more cases of plums which I sent him some days ago, which will enable him to aquaint the trade and the public this year with the product of this new industry.

He will create an outlet for our fruits in the years of abundance and will encourage by his industry the planting of new orchards.

The Committee of the Conuty of L'Islet Horticultural Society, charged with the duty of inspecting the orchards and making a study of the most prolific species, remarked that the "Lombard" and the "Grand Duke" surpass all the other plum trees in fertility, and that "Moore's Arctic" follows them closely in vigor and productiveness, that the superb "Washington" the delicious Reine Claude "Green Gage" and the large and fine "Pond's Seedling" should be in all the collections and that the magnificent "Bradshaw" deserved a place in sheltered gardens.

The Committee approved the putting in of manure in July and of a straw mulch at the foot of the plum trees loaded with fruit. These manures enable the trees to support the biggest crops without becoming exhausted. The manures and wood ashes help them to form wood and good fruit buds for the next year.

THE CHERRY TREE

The Cherry tree has a gummy juice, the grain of the bark is circular and has great strength. The leaves are plain, notched, stipulated often glandular at the base or on the leaf stalk. The flowers grow upon a kind of umbel.

Cherry trees prefer a light dry soil ; in wet ground the fruit is not so well flavored and is more liable to be gummy. The Guigniers and the Bigarreautiers are delicate and difficult in the land they require, especially when grafted on the Mazzard or black cherry.

Two kinds of trees furnish the stocks on which Cherry trees are grafted, the Merisier (the English Mazzard) and the Mahaleb or Ste. Lucie, the first is a high tree in the form of a pyramid, with fruit of a deep red or black and is very like the Guigniers and the Bigarreautiers The second is a very much smaller tree, more hardy, capable of flourishing in soil in which the Merisier would fail entirely ; and wild in the forests of Europe. Its fruit the size of a pea is black and very bitter. Both are largely cultivated in nurseries as stocks for grafting. The Merisier furnishes the stock for high or standard trees in ground and localities where they will grow and the Ste. Lucie those for the half stem trees and dwarfs. As a general rule in Canada, trees grafted on the Merisier only succeed in situations exceptional as to exposure and quality of the soil. For this reason grafting on the Ste. Lucie is much preferred. There are many varieties of Guigniers and Bigarreautiers which do not succeed even when grafted on the latter stocks, at least in the neighbourhood of Quebec and in the East.

Increase of the Cherry tree.

Although the spreading roots of the Cherry tree often throw out shoots or suckers which are sometimes used for grafting, still the more general way of reproduction is by sowing. The Merisier and the Mahaleb or Ste. Lucie are largely cultivated in Europe solely for the purpose of furnishing seed to the nurseries. In America the Merisier is the only one cultivated up to the present for that purpose. The seed is still brought from Europe every year. The fruit allowed to ripen perfectly upon the tree is freed from its pulp by washing and when not used for immediate planting which is the best thing to do with them, they are stratified, in the following way, for planting during the next spring. Upon a bed of sand slightly moist, placed in the bottom of a box, we deposit a layer of the fruit stones and upon them another layer of sand and again another layer of fruit stones and so on until the box is full. The box is then placed in a cool cellar and the stones are planted in the spring. At the end of the autumn or in the following spring the plants are generally strong enough to be placed in the nursery.

Grafting the Cherry tree.

Scutcheon grafting is generally adopted for Cherry trees. Grafting in clefts might have a tendency to produce gum. The stocks are generally fit to receive the grafts after the second year. Usually about the beginning of August the eyes of the new shoots are sufficiently matured to furnish the scutcheon. The grafting of cherry trees is almost as simple as that of the apple tree ; great care must be exercised not to wound the epidermis either on the stock or on the graft.

Pruning the Cherry tree.

Of all fruit trees the Cherry tree is the one on which pruning should be practiced with the greatest moderation, as wounds upon them, especially if they are large, are liable to produce exudations of gum which are always most damaging to the tree. It might almost be said, that once the Cherry tree has been permanently put down it should never again be touched by the knife, except to remove diseased branches or branches likely to produce confusion, and in the spring to reduce the length of the shoots of the preceding year particularly during the first years of its existence.

The shortening of the shoots of the young trees in the spring is an absolute necessity, created by the rigors of our winters ; as a proof of which one has only to take a brief look at a young tree, allowed to grow without care, to notice that the young shoots rarely continue their growth from the terminal eye but rather from the second or third situated lower down leaving a stub, long or short as the case may be, which besides giving a neglected appearance to the tree, absorbs a certain amount of the nourishment by vegetating feebly during one or two seasons before it finally dies.

It will also be observed in pruning these neglected shoots that the eye which has continued the growth of the shoot, is rarely found resting on perfectly sound wood, although on wood capable of vegetation, but at the same time more or less injured by the frost. The shortening of the shoots provides against all these misadventures in causing the growth of the branch to continue from an eye well formed and located on perfectly sound wood. It may also be observed that often in the autumn the wounds of the pruning are already almost entirely healed.

From the first shoot from the graft of the Cherry tree the plants often attain a height of 3 or 4 feet. In the following spring they should be cut down to about one third for standard trees and to 5 or 6 eyes for dwarfs, and the lateral branches which are thrown out during the second year immediately furnish the principal frame for the tree.

On standard Cherry trees grafted on a Merisier, 4 or 5 feet of the stem is left bare, but for those grafted on Ste. Lucie 2 or 3 feet will be sufficient and when true dwarfs are required, not more than one foot at the most.

Standard Cherry trees are planted like plums at a distance of 12 or 15 feet apart. 8 or 10 feet is generally far enough for half standards while only 4 or 5 feet is a sufficient distance between dwarfs.

Once in position Cherry trees require absolutely the same attention as plums, that is, the soil must be kept clean and loose by cultivation or digging and fertilizers applied from time to time.

Diseases of the Cherry tree.

The principal, in fact one might say the only disease of the Cherry tree, is gum, which is due, as it is also in the Plum tree, to the vitiation of the sap. This disease manifests itself first by a deeper colour of the epidermis of the bark on the stem and branches, forming like small stains at first, but the epidermis soon splits open and a clear transparent gum appears at once in greater or less abundance and almost at the same time the sides of the sore assume a blackish tint, the bark becomes torn, producing scurfy excrescences or swellings and frequently, at the end of a single season, the tree will not have a solitary branch intact On each one of them, these dark excrescences will be seen. Sometimes these sores first show themselves near the ground and often in a short time after, on stems of 6 and 8 inches in diameter leaving not more them 2 or 3 inches of sound bark in the whole circumference; from this moment the tree is lost without recourse. As soon as the gum appears at any point the parts attacked must be at once cut out to the very inside of the tree and the wound covered with grafting wax; at the same time the deficiencies of the soil must be corrected, if too wet it must be drained and manured if it has become exhausted. Magnificient Cherry orchards have been know to perish in a few years, solely as a result of this disease.

Fruit of the Cherry tree.

The Cherry is an excellent fruit, generally eaten raw, but from which jellies, preserves and liquors are also made. The celebrated Marasquino of Venise and Trieste is prepared from a cherry called Griot Marasquin. The liquor known as Kirsh or Kirschenwasser made in Germany is manufactured from the Mazzard or black cherry.

The following are the most valued varieties :

" **The Cerise de France** " (the old French Cherry) grows and produces everywhere abundantly on the banks of the St. Lawrence and has stood and reproduced in the same ground for over a century. Planted in new soil the trees grow well, produce early and are less liable to the gum and black knot than in the old orchards where they have exhausted the nourishment the soil affords. This variety seems to be identical with the Early Richmond, a variety of the Morello class, it is delicious and should be better disseminated through the country. The Hearts and Bigareaux are killed by the winter, East of Quebec, but succeed tolerably well in some places in the more Westerly portions of the Province.

The Early Richmond. — A well known cherry of medium size, dark red in colour, flesh juicy and acid. The tree grows vigorously and may be planted in all regions.

The Empress Eugenie. — Fruit large, of a dark red colour, flesh juicy and tender, slightly acid. The tree is vigorous and hardy.

The English Morello. — Fruit large, deep red, flesh tender and juicy, slightly acid, a very early tree, it is vigorous and very hardy.

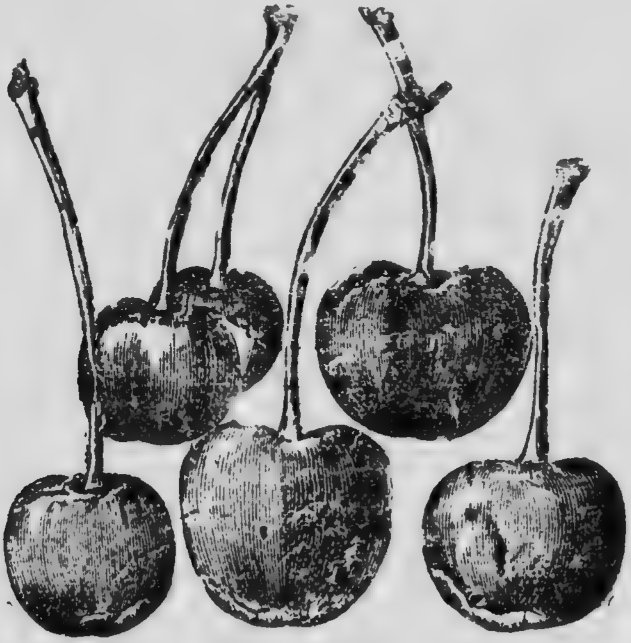


Fig 70.—Cherries.

The Large Montmorency. — A vigorous and hardy tree, it bears abundantly, fruit very large, flesh fine and delicate, ripens about one week after the Early Richmond.

The Louis-Philippe. — Fruit large, a black red, tender and juicy, slightly acid in flavour, ripe about the end of July. The tree is vigorous and hardy.

FRUIT BUSHES

THE GOOSEBERRY

The Gooseberry is one of the first fruit bushes to begin vegetation in the spring. It grows in all soils and in every exposure. Still the fruit is larger and sweeter when grown in smooth sandy and somewhat moist ground.

The Gooseberry is propagated by planting and from cuttings and layers, the two latter methods being the most generally employed. Cuttings from old trees are planted, or the branches of a parent tree are bent down in the spring in such a way as to be able to force them down some inches into good and well loosened soil, keeping them in position by means of a small fork which is stuck into the ground.

If the earth covering the layers is itself covered by moss or dried grass to retain the moisture, by the autumn of the same season they will have taken root sufficiently to be placed in the nursery and a year later they will be strong enough to be planted out permanently.

It is often better to raise the extremity of the branch which has been thus laid in the ground by means of a small stake so as to force it at once to take an upright position.

The Gooseberry bush only gives its fruit on wood of 2 years and generally grows in tufts.

To cause it to spread instead of allowing it to remain in tufts the following system has been employed At the end of the first year there is a stem of a few inches in height with a few small branches at its head.

The three best branches are chosen to form the head of the bush. The others are cut off. To each of these three branches only three eyes are left and when they have developed only the strongest one is kept.

In the spring of the second year your bush has a head with only three branches furnished with more or less lengthy shoots. These shoots are reduced to three eyes only of the pruning of the preceding year, two of these eyes being intended for the production of lateral branches and the third for the continuation of the principal branch.

They should be pruned afterwards and the weaker branches should be removed.

To make sure of fine fruit and in abundance the Gooseberry bush must be well manured every year and all dead branches must be cut off.

The fruit of this bush is a berry generally round but sometimes ovoid in shape, and green, yellow or reddish in colour.

The enemies of the Gooseberry.—For some years past a most dangerous enemy has attacked our Gooseberry bushes. It is the larva of a species of Tenthreline, it is called a Saw-fly.

The Saw-fly appears in the month of July and if not at once destroyed the whole crop is lost.

The most effective remedy against this dangerous enemy is white hellebore, which may be procured from the Apothecaries in powder. Gooseberry and Currant bushes infested with these tenthredo or false caterpillars, must be sprinkled with an infusion of this powder and the insects are destroyed without any danger of the poisoned liquid attaching to the fruit.

Another and perhaps a more successful way of destroying them is to examine the leaves of the bushes and crush the eggs before they have hatched out.

The varieties of the gooseberry are the Downing, Industry, Triumph and the White Smith.

THE CURRANT

The Currant bush gives a most palatable fruit, suitable for numerous dishes, preserves and jellies. For some years past a wine has been made from it which is not without its merits and becomes heady with time. Currants are divided into red, white and black. The red are the most acid, they are preferred for jellies The white by their sweetness compensate the acidity of the red. Lastly the black Currant has a flavour exactly similar to the aroma of its leaves; it is called the Cassis.

The principal varieties are:

In reds: the red German, the red Knight, the Victoria and the Cherry

In whites: the white German, very good for eating raw, the white grape, the Prolific.

In blacks: the black English and the black of Naples.

The propagation of the Currant is easy. Shoots of the previous year, from 6 to 12 inches long cut from old wood and stuck into the ground in the spring, become plants in the autumn.

They require the same cares of cultivation as the Gooseberry. They generally grow in bushes but they are improved if, by a special pruning, they are made to grow as shrubs. Similar to the Gooseberry the Currant only gives its fruit from wood of two years old, except however the black Currant which produces on wood of one year.

The enemies of the Currant.—The appearance of caterpillars must be watched so as to attempt their destruction by sprinkling with an infusion of powdered hellebore. It is well to anticipate the evil by sprinkling with this infusion from time to time between the 15th of June and the end of July.

RASPBERRIES: BLACKBERRIES

Raspberries are an excellent table fruit, they must be served fresh as they spoil rapidly. Sirups and jellies are made from them.

The Blackberry belongs to the same species and to the same family as the Raspberry. It differs but slightly from it, except in the fruit which is generally of a darker colour and the berry of which adheres so tenaciously to its receptacle that it cannot be separated without being crushed. Ripening after the Raspberry it continues in fruit until the plum season and even to that of the early apple.

Varieties of the Raspberry.

The Cuthbert.—Fruit very large, red and succulent, bears abundantly.

The Golden Queen.—Fruit white and well flavoured.

The Caroline. — Fruit yellow, much liked and very abundant.

The Ohio.—Fruit black.

Varieties of Blackberies : *The Columbian, Rawson, Sans Epines* and *Black Cap.*

Raspberries and Blackberries should be planted in a corner of the garden rather than in the borders, as they exhaust the soil and might injure the other plants. A light, loose and somewhat humid soil is best suited for them.

The land should be kept clean and clear of weeds. In the autumn, or better still, immediately after the gathering of the crop, the fruit branches and the upper third of all the stems of the year should be cut off and removed. The shortening of the latter encourages their fruiting their whole length and the production of larger fruit.

Reproduction and pruning of the Raspberry.—There is nothing easier that the increase of the Raspberry bushes through the number of suckers they throw out from their roots. The branches may also be made to take root as layers. There are even some kind, such as the black and the white Americans which take root of themselves as soon as the end of a branch touches the ground but growing from suckers is the easiest and most generally employed manner of reproduction.

The pruning of the Rapsberry is easy, as in many cases it is reduced to the simple removal of the stems which have borne fruit so as not to obstruct the new ones which will produce in their turn. Still to make sure of fine fruit well flavoured and abundant, the Raspberry, besides requiring the ordinary cares of cultivation, must also be submitted to the pruning hook. This consists solely in shortening more or less each stem in the spring according to the vigour each may possess and the damage it may have received from the winter frosts, so as not to permit the loss of sap in diseased or weakened parts and to concentrate it on the eyes which produce the fruit buds.

Reproduction and pruning of the Blackberry.—As soon as the crop has been gathered, the fruit branches, already withering are cut off as well as the ends of the young branches at about 7 or 8 feet from the ground, so as to make room for the growth of spreaders. The latter must be pinched in the autumn at a length dependant on their positions on the principal stem, the lower ones being left longer than those higher up.

This method of pruning increases the number of eyes which are to produce secondary branches and besides brings them nearer to the base, gives them a greater abundance of sap and enables them to attain a larger growth.

THE CULTIVATION OF THE VINE

In our climate the table grape cannot arive at perfect maturity without certain indispensible attention. The vine grows vigorously and throws out a great number of shoots, the prolonged growth of which consumes much ef the sap and retards the maturing of the fruit.

The vine does well in almost any soil, but it is in a fresh rich ground that it displays all its strength and its rapidity of growth. At the same time the grape has little flavour and notwithstanding its fine appearance, its maturity is effected, by a slightly unfavorable season.

The land chosen must be of medium firmness somewhat strong, heating easily and draining rapidly. When the soil is cold it must be improved by the addition of sand or composts in which there is a large proportion of lime; old plaster may also be advantageously employed. A southern exposure and hilly land are to be preferred.

The ground should be well broken up in the first place. In vine growing this is often neglected, which is a great mistake, as the greater the facility given for the extension of the roots, the greater the success which may be attained.

The vine is easily propagated by slips, the crossette, layers, grafts and by sowing.

A slip is a sprig of the same year, about 1 or 1½ foot long which is stuck vertically into the ground after having been first soaked in water for several days. Two eyes are left out of the ground which will start the stem of the vine. It is better however to bury it in a little trench opened for the purpose. Placed thus it takes more easily. This method of reproduction is useful but slow.

The crossette is a slip having at its lower end a small piece of two years old wood; it is planted in the same way as the slip but its success is more assured. It grows perfectly. Like the slip it only produces at the end of three or four years. Growing from layers is preferable as fruit is obtained earlier.

Layers are set in the spring. The finest twigs are chosen, a small trench of 7 or 8 inches in depth is dug at the foot of the vine, the twig is laid in this trench to a length of 10 or 11 inches giving it a light bend at the bottom of the trench. It is covered with earth and cut off at the second eye. Eyes which may be upon that part of the twig between the vine and where the twig enters the ground are suppressed, to prevent them from absorbing the sap to the detriment of the layer. The eyes on the buried portion are preserved, they will create numberless roots. The autumn following, the layer may be severed from the parent stem and used for planting if it is strong and has well nourished eyes.

Grafting is used to reproduce a species or to change the nature of a vine by substituting a new species to the old, or else, more generally to rejuvenate an old vine, or again to replace shoots which have disappeared and also for the purpose of sooner obtaining the fruit of a new [illegible] en during the second year.

Sowing is another method for the reproduction of the vine, but little used on account of the uncertainty of its results and the length of time before fructification. We merely mention this method without detail.

The Vine plant.

This name is given to all sorts of vines under whatever form they may be trained, but the name is most generally applied to those that are cultivated in gardens or in the open field.

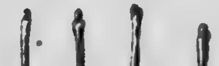


Fig. 71.

A layer is planted the first year. It is cut to two eyes (fig. 71) which have given twigs *a. a.*, these have been either pruned off, tied up or pinched as necessary. The second year they have been again pruned to two eyes at *b.* which produced twigs *c* ; these are pruned the third year also to two eyes at the point *d* and so form the vine of which A is the root. During the following years all the twigs are pruned as in the figure, to near the layer, so as so have after each pruning not more than four runners giving together eight twigs capable of yielding sixteen bunches of grapes.

Planting the vine (fig. 72).

Before planting, the ground must have been broken up and manured as required. If the plantation is to be a trailing vine or a contre-espalier a trench of 8 or 9 inches in width by 10 or 12 in depth according to the ground, will be sufficient and the crossette or layer, with only the strongest twig left upon it, is placed in it at the place where the vine is to be raised. If on the contrary an espalier is wanted the best method to follow is to make a trench from one end of the wall to the other, between 15 and 18 inches deep and 2 yards in width In the bottom of this trench put a bed of well rotted manure and cover it with 5 or 6 inches of good earth ; the layers are then placed parallel to one another with a space between them which will vary according to the height of the wall and the form of the trellis. In the first year they are laid within 30 or 36 inches of the wall and covered over with 10 or

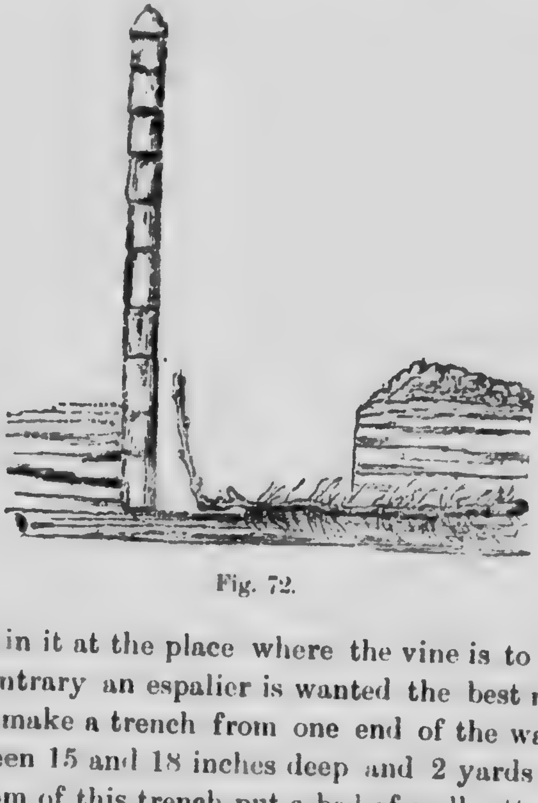


Fig. 72.

12 inches of ground, cutting them off to two eyes only, These will grow and should be attached to props or poles ; false shoots will be carefully pinched at one or two leaves without being further shortened, which will only be done later on in August and the shoots themselves pruned at the ends at the same time, seldom before, unless they have grown too long. The object of this pruning is to concentrate the sap at the base of the part that is kept and to cause the twig to become large and to secure the complete maturity of the wood. The strength of the shoots of the following year depends largely on this operation, without it the twigs would remain light and slim and would only give weak shoots. In the second year of the plantation the weakest twig is cut off and the other is cut down to two eyes. During vegetation the same attention is given as during the previous year ; the two new shoots are tied, pruned and dressed if necessary, but at a height of about 4 feet. Planting at the foot of the wall is done even the first year, time is gained in this way without prejudice to the future wellfare of the vine, for often in soil of this nature the new roots which grow from the layer during the second year, acquire such strength that the roots from the first part are often destroyed and killed.

Some people prefer planting, at once permanently, slips that have taken root. They obtain as satisfactory results as with layers and gain some time. This system can only be sucessful if the slips have been carefully raised in nurseries so that they will be already strong when put down : crossettes should be used in preference to the ordinary slips.

The vegetation of the Vine.

The vine grows rapidly ; when left to itself in our climate, it produces next to nothing. Pruning is more necessary to the vine than to any other tree.

According to the way in which it is grown the parts are known as frame branches or fruit branches.

The former take different names according to the form which has been adopted, such as the stock in the vine &c. The second are represented by twigs or sprigs growing from buds on the branches of the vine or on the shoots.

The eye in the vine " la bourre ", has two supplementary eyes at its base, which develope either in consequence of an accident to the principal eye or spontaneously on the shoots, when they become false shoots. The supplementary eyes, when they grow as a consequence of the frost having destroyed the original eye or its shoot, which is then removed, or accidentally, and are preserved, are capable of giving fruit but the bunches are not as heavy as those which would have been produced from the original eye. The vine has the faculty of repercer on the old wood, the shoots which grow from it are almost always barren, only after the twigs have been pruned will they fructify. The first trimming of the shoots takes place in June and is continued until August for the false shoots.

The vine always give its fruit on the shoots of the year. It is only after the eye has developed that the bunches can be seen, of these there are generally two. The twig which has once produced fruit never does again. It should be renewed. The great vigour of the vine often causes it to throw out false shoots which should be cut off, unless under certain circumstances in which they are used, and their growth even encouraged.

It also causes the failure of much of the fruit and the throwing out of numerous tendrils which twine round everything within reach ; these tendrils should be carefully cut off.

The vine has a very thin and weak bark which must be saved as much as possible as it does not recover from wounds which simply heal over but always remain visible.

The time to prune.—In our climate the month of May is the best time for pruning the vine. It should be done when the severe cold of winter is passed but before the sap has commenced to ascend so as to avoid the heavy loss of sap which would occur if the operation should be put off too long and to preserve the eyes from the moisture caused by the escape of the sap and to render them less liable to be frozen.

It is well to remember than in this species of plant, the wood of which is of a spongy nature it is important to put off the cutting of the eye, as the aiglet has a tendency to dry up. If the pruning was done late and the over abundant sap was oozing from the plant, the cutting of the eye would have to be further put off. The aiglet is cut off the following year.

The frame branches.

As the vine is a strong grower, it might be imagined that, in the pruning, the branches of the frame should be grown long; but this would be a dangerous error and entirely unfavorable results would follow. They must on the contrary be kept short. If pruned long, the sap, going to the extremities will neglect the eyes near the base of the sprig which would remain inactive or would only sprout weakly, shoots would be lost and bare spots would inevitably be formed.

No matter what may be the strength of the vine, the frame branches should never be pruned beyond the fourth or fifth eye which would still often be too long.

The fruit branch.

On the vine the fruit branches require renewal but it is always easy to find buds to replace them. So if the sprig A (fig. 73) is to be pruned, it is cut off at the second eye *b*, the eye *c* at the foot being the first, and it is this eye *c* which will give the new sprig upon which the next years pruning will be done. Figure 74 shows the results of this first pruning. The second year the shortened shoot *d* is brought nearer to the small branch *c* which in its turn is pruned as in the preceding figure.

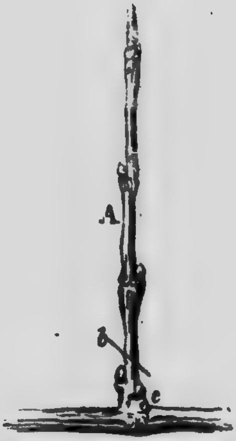


Fig. 73.

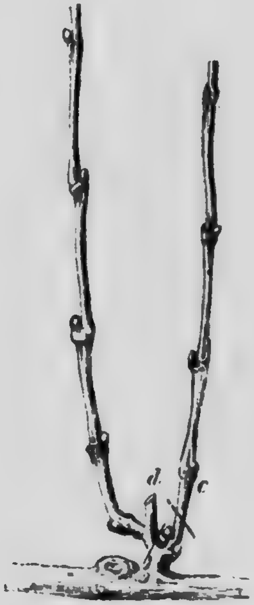


Fig. 74.

The lengthening of the shoots must be avoided as they become weak and knotty and end by dying, leaving bare places on the frame. Therefore each time that it is possible to renew them from shoots near the root, advantage should be taken to do so.

Although only two eyes have been left on a shortened shoot, almost always, when the vine is young, casual and supplemtary shoots are thrown out; all these growths are cut off at the first pruning, when the shoots from the reserved eyes are 3 or 4 inches long and the bunches can be seen. If one of these shoots happened to be well placed and offered a certain base, it should be retained to renew a part of the shortened shoots. In such case one of those furnished by the two pruned eyes should be removed, the least well placed, unless the other shows no fruit. Sometime afterwards when the shoots are 10 or 12 inches long, false or premature shoots are formed at the axils of most of the leaves; they must be carefully removed as well as the tendrils which would uselessly absorb a portion of the sap. The first fastening or paling up of the strongest shoots is then begun; the others still remain free: they are only fastened up successively as they enlarge and pruning is continued upon them. When the shoots have reached the desired limit they are pinched. This pinching, which should be done before the flowering and immediately after it, but not while the vine is in bloom, has the effect, by stopping them in their length, of driving the sap to their lower parts and causing them to grow larger. It also contributes powerfully to the maturing of the sprig and consequently of the bunches of grapes, which receiving more nourishment become finer fruit.

The eye which has been pinched, and often the one next before it, develope; the shoots coming from them are taken off for the reasons given above.

A Green-House.—Figure 75 shows a green-house with a double roof. In this green-house the front and rear walls as well as the two sides of the roof are of the same dimensions;

it would however be better to raise the wall on the North and lower it as much on the South side and to lengthen the South side of the roof and shorten the North side in proportion as shown in figure 76. The Green-house is so constructed as to present its front or principal face to the South ; the doors are placed in the gables which need not be made entirely of glass. From 15 to 18 feet in width by from 13 to 14 in height are the usual proportions employed. The roofs are made of frames of glass from 3 to 3½ feet wide. A certain number of these may be fastened in their positions and the others left moveable for ventilation. They should be made to slide in grooves so as to open or shut them at will. The front and rear walls may be replaced by simple board partitions fastened to posts sunk sufficiently deeply in the ground to prevent their disturbance by frost.

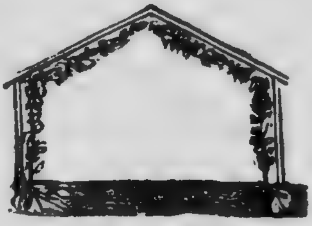


Fig. 75.

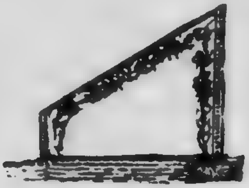


Fig. 76.

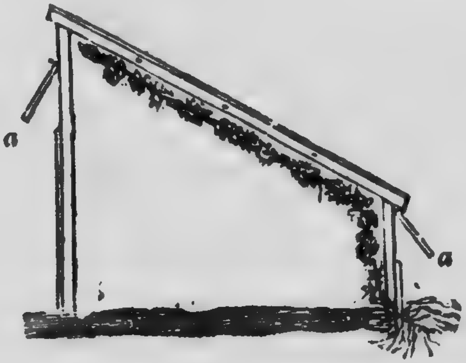


Fig. 77.

Fignre 77 shows a still less expensive green-house, as it requires less glass and all the windows in the roof may be fined in positions, ventilation, being effected by means of traps *a. a.* hung on the walls and by the doors in the gables. There is nothing to prevent the division of the glass frames in the roof into two so as to diminish their length. In the latter green house the cost of the rear wall may often be saved by making the gable end of a barn or of any other building answer the purpose.

DISEASES OF FRUIT TREES

Fruit trees are liable to suffer from enemies and diseases of which it is well to have some knowledge, if not very profound, at least sufficient to understand their effects and to be able to meet them with the proper remedies.

Gum.

This is a disease special to trees bearing nut fruits, it consists in the extravasion of the sap or the juices which takes place on the exterior of the tree: the bark splits and gives a passage for the gum This disease, the causes of which are attributed to the soil, to meteorological circumstances, to contusions, to hardened bark which interferes with the circulation of the sap and to intermittence in the regularity of its flow, when in the spring hot weather is followed suddendly by cold, has the effect of destroying the branches or portions of branches on which it appears. The only efficient remedy is to scrape off the deposits, that are formed, with a sharp pruning knife cutting in as far as the live wood, as soon as the disease shows itself. (see page 147).

Diseases of the vine.

The "Blanc".— This desease is common to a great many plants; we will only consider it in connection with its effect on the vine.

It shows itself in the form of dust or a whitish film, attacking the leaves, the buds and the fruit: it is due, to the presence of various kinds of fungi, among others the oïdium, monilia &c. al least the fungus is the apparent result.

If the attack is light and taken at the beginning, flour of brimstone and its compounds or better the flour of brimstone alone will cause the disappearance of the fungus : two or three applications in a year are sufficient. If the disease is severe, whether taken at the beginning or not, the fungus reappears continually and the brimstone must be used a great number of times. The crop may be saved but it will have lost considerably both in quantity and quality The flour of brimstone is the most efficient of all treatments so far discovered. It gives the most satisfactory results in the great majority of cases. We therefore recommend its employment without waiting until the oïdium has had a good start or even until it has appeared. The use of the brimstone is an excellent precaution even before the appearance of the disease.

When flour of brimstone is used, it should be as dry as possible and without lumps, which renders its application more easy. It is dusted over the vine by means of a small bellows made specially for the purpose

Canker.

Cankers are recognized by a sort of slimy ooze which comes from splits in the bark, which at other times is attacked by dry rot. All trees but particularly pear and apple trees are subject to this disease, the presence of which indicates an unhealthy condition or exhaustion. Sometimes however they are the result of accidents, such as blows, bruises, &c., in which case they are easily cured. The sores are scraped down to the live wood with a cutting instrument and then covered with grafting wax or ointment. They should be treated as soon as noticed. When they are due to a want of vigour in the tree, all the old bark must be taken off and the spots scraped to the live wood and if necessary the tree is cut short and low so as to obtain new shoots. Cankers are as often met with in dry warm ground as in ground which is cold and wet.

Jaundice or Chlorosis.

This disease attacks all trees, but the pear trees more frequently than others. The leaves become yellow, the buds stop growing, the branches droop and often dry up at the ends. This indicates either exhaustion, or when it lasts during the whole season, an absence of sufficient depth of soil. If due to prejudicial atmospheric influences, such as a great drought or prolonged periods of wet weather, which cause the tree to droop, there is no serious danger and as a rule it will pass away with the causes which produced it. When it continues, vegetation must be revived by manures. The exhausted soil must be taken away, new soil is put into the hole and the tree is virtually replanted. Unless too old, the tree acquires new strength which prolongs its life for several years It is readily understood that such an operation to be successful, must be performed with the greatest care. Sulphate of iron applied either by immersion or spraying in doses of 20 grains to a pint of water gives very favorable results.

Mosses and parasitical plants.

Fruit trees of all ages are almost always overrun by mosses, lichens, fungus, &c., which impede their functions and do them harm. They are got rid of by sweeping them off with small birch brooms. The birch twigs are bound firmly together by wire. These brooms are easily made at home. If the weather should be very dry the tree is first wet with a syringe or hand pump. Liming is also an excellent treatment. Lastly a simple washing with plain water is sufficient, if the parasites are not adhering too thickly.

ANIMALS THAT DAMAGE FRUIT TREES.

Birds.

The number of birds which attack fruit is so large, that it useless to mention their names. The damage they do is unfortunately too well known. To keep them off is not an easy matter. Every kind of scarecrow has been tried, but they soon get accustomed to them. Firing off guns or covering with nets or cloths are good in their way but have their disadvantages, the first is too expensive and takes up too much time, the others prevent or retard the ripening of the fruit. Wreaths of white paper with black rags attached placed about, answer pretty well but they do not last' Besides these methods are only practicable for espaliers. Standard trees can only receive slight protection.

Rats, field mice, moles, &c.

Animals of this class, or rather the dormouse which belongs to same species, cause havoc in gardens ; they attack seed, fruit, &c. We will not here describe the various traps which are used for their destruction, they are to be seen everywhere, but we would recommend the employment of poisoned bait as the most sure and expeditions way of getting rid of them. Nux vomica and arsenic are difficult to obtain and dangerous to use. Lime or plaster mixed with flour is good but a paste of phosphorus is better and has the same effect. It is spread upon bread which is cut into small pieces, being careful not to allow the bread to be touched by the hand, as it has been noticed that these animals avoid food touched by the human hand.

Caterpillars.

Caterpillars devour the leaves of trees, which they often completely strip and thus injure their products. While young they live together and move from place to place, but when three quarters grown they disperse. Before they separate is the easiest time to effect their destruction. They are removed by a special instrument made for the purpose called an "*echenilloir*". The nests, which are always found at the ends of the branches, are cut away by this instrument and burned. As fast as they are hatched, they collect together in groups, these may then be crushed by hand. A spraying of soap and water or better still of hellebore has a good effect. Chimney soot is also used.

Grubs.

These small, but too well known insects, cause considerable damage by their enormous number. They attack the extremities of the buds and leaves to such an extent as to stop or seriously to interfere with vegetation in the parts they have reached. The most successful, we might say an infallible treatment of these pests is fumigation with tobacco or spraying with a decoction of the same plant. After the fumigation the leaves must be washed by means of a hand pump so as to detach those not completely killed, but only rendered torpid. On the ground they die at once The tobacco water must be prepared before hand and must be thick so as to have greater strength.

Another receipt is :

Quassia chips	8 lbs.
Whale oil soap	7 "
Water	100 gallons.

The quassia chips are boiled for an hour in about 8 gallons of water, the soap is dissolved in boiling water, the two solutions are mixed together and water is added up to 100 gallons. This is then plentifully applied with a sprinkler.

Kermès.

This is an insect which attaches itself to the branches so extensively as to interfere with the functions of the tree and to cause it to droop and fade. They may be rubbed off with a coarse brush or scraped off with a blunt instrument. The branches are then washed with a decoction of tobacco or with a solution of whale oil and then limed.

Ants.

Ants injure the trees by attacking the buds and fruit, but the damage they cause, is slight. There are few methods known for their destruction. Honey and water in small bottles which are hung upon the tree or vine are generally employed. Fish oil keeps them off but does not destroy them. When an ant-hill is discovered, it is burned, or boiling water is thrown upon it, or coleseed oil, mixed with a little water, or better than all, a handful of guano. This manure appears not only to destroy the ants but also their eggs.

The apple fruit-miner.

(*Argyresthia conjugella, Z.*). — This insect, which has attracted so much attention of late years by its destruction of the apple crop of British Columbia, has again been the cause of considerable loss. In orchards containing several varieties of apples, the native apple was more liable to be attacked than the larger varieties.

There is no certain remedy known. All that we can advise, is to wrap around the trunk of each tree a double band of hay or a band of cloth 4 or 5 inches wide, one of these bands close to the ground and the other a little higher up. The caterpillar seeking a crevice in which to spin its cocoon, will not fail to stop at these bands, and by examining them once a week, a great number can be collected which are destroyed by being burned or scalded. All apples which have fallen from the tree should be destroyed at the same time as there are generally caterpillars inside of them.

But the best way of all for the preservation of trees, and especially apple trees, from the attacks of insects is by liming.

Grubs on the Cherry tree.

An emulsion of petroleum may be advantageously used. Mr. Palmer, who has had much experience in the treatment of grubs upon apple and other trees in British Columbia speaks very favorably of the following lotion made from tobacco and soap : " 4 lbs. of tobacco waste are soaked in 9 gallons of boiling water for 4 or 5 hours (or in the same quantity of cold water for 4 or 5 days) 1 lb. of whale oil soap is dissolved in 1 gallon of boiling water. The decoction of tobacco is poured into the solution of soap and the mixture is plentifully applied to the trees with a sprinkler having a spout which reduces the liquid to a fine spray.

Treatment by pulverizers.

In all the Provinces, irrefutable proofs attest the great value of treatment by pulverizers for fruit trees to ward off the dangers from insects or fungus.

Intelligent farmers know the great advantages of a careful treatment of their crops with the aid of pulverizers. The practical fruit grower is now seldom heard to give the childish and illogical excuse that he had no time to treat his trees, as he knows perfectly well that pulverization and profits are synonymous terms. There are publications now in Canada, free for the asking, which teach the advantages of treatment by pulverizers and give detailed information as to the manner of preparing and applying simple, cheap and effective remedies against hurtful insects or the troublesome diseases that are met with in our orchards. It would appear to be unnecessary to recall the attention of a reflecting man to this subject ; but there are still some fruit growers to be found everywhere so indifferent as to never follow the advice given. I will again here call attention to these remarks, which, I trust will have the effect of convincing a larger number of fruit growers and farmers generally that if they adopt the treatment by pulverizers, they will be well repaid for their trouble and that careful and conscientious efforts are more certainly crowned with success by the use of pulverizers upon fruit trees than in any other branch of agricultur

It must not be forgotten that a great number of insecticides and all the fungicides are poisons !

Label all poisonous substances and put them out of the reach of animals and of ignorant people and children !

Do not put copper compounds into iron vessels !

Do not continue the applications on fruit which will be fit for gathering within 3 or 4 weeks !

Make trials in a small way, if you fear the effect of the remedy on the foliage !

Never apply the remedies when the trees are in blossom.

Liming.

Liming is done with lime water some what thick and freshly prepared (see page 102)

Bordeaux mixture.

Is composed of :

Sulphate of copper (blue vitriol)....	4 to 6 lbs.
Live Lime.......................	4 lbs.
Water	40 gallons.

To prepare Bordeaux mixture, take 4 lbs. of sulphate of copper (blue vitriol) in powder and dissolve it in a gallon of hot water in a barrel or a wooden tub (an iron vessel must not be used as it would be acted upon by the sulphate of copper). Enough water is poured over 4 lbs. live lime to form a clear mixture. This mixture is passed through a sieve or piece of coarse cloth which collects all lumps When the two liquids have become cold, the cooling may be hastened by the addition of several gallons of cold water to the solution of sulphate of copper, the lime water is poured into the solution of sulphate of copper, stirring the whole time with a stick. After this enough water is added to make 40 gallons in all and the mixture is ready. Each time it is to be used it should be thoroughly stirred. The barrel must be kept covered to prevent dust or dirt from falling into it.

To apply this mixture to the leaves a pulverizer is employed, but if there is none, a watering can, with the rose pierced with small holes, is used instead. There are many kinds of pulverizers in the market. The most handy for farming purposes is a force pump, fixed on a barrel mounted on wheels, and which is drawn over the land by a horse.

Bordeaux mixture is an excellent fungicide, that is it stops and destroys the growth of fungus, parasites, scab and black stains on fruit trees, &c.

Bordeaux mixture and Paris green.

As Paris green is the best insecticide, especially for potatoe bugs, the worm in apples &c., it ts often used as a mixture with the Bordeaux mixture.

A ¼ lb. of Paris green is diluted in enough water to form a thick paste which is added to the 40 gallons of Bordeaux mixture. This solution of Bordeaux mixture and Paris green is therefore a fungicide and at the same time an excellent insecticide.

During its application, the solution must be continually stirred up (good pulverizers are furnished with an automatic mixer) as the lime in the Bordeaux mixture and the Paris green precipitate rapidly in liquid in repose.

Emulsion of Petroleum.

This insecticide, very largely used for grubs, caterpillars, spotted wood, animal parasites, the horn-fly, &c., is composed of :

Petroleum (coal oil)	2 quarts.
Common hard soap	2 ounces.
Water	28 quarts.

The soap is boiled in a quart of water until dissolved and the boiling solution is poured into the petroleum and with the aid of a syringe and a force pump the mixture is well stirred for 5 minutes; when it has a creamy appearance 27 quarts of water are added. This emulsion is used from a good pulverizer.

Powder of Pyrethrum.

This powder is best used dry. It is generally mixed with 4 times its own weight of flour and kept in a well covered jar. It destroys caterpillars especially those which attack the cabbage and is very useful in cases where the use of Paris green wovld be dangerous, as on vegetables and fruit a short time before they are gathered for use. For insects it is an active poison, although practically harmless to man. To apply it a bellows with a reservoir is used which may be bought from the seedsmen.

White Hellebore.

A vegetable insecticide. It is prepared from the roots of the Veratrum Album, reduced to a powder; it is employed like the powdered Pyrethrum in cases where the use of Paris green would be dangerous. It is applied dry as a powder, or mixed with water, one ounce to two gallons. But its best use is in the form of an infusion which is poured upon the ground about the roots of cabbages, raddishes, turnips, &c., the infusion kills the worms which attack these plants; it is prepared with ¼ lb. of hellebore and 2 gallons of hot water.

Solution of sulphate of copper.

Dissolve 1 lb. of sulphate of copper in 24 gallons of water. It is a fungicide employed against vegetable parasites, such as rust, swellings, scab and other fungous diseases of raspberry bushes, pear and apple trees, vines, &c.

It is also used to sulphate seed grain. The grain is put into a bag and soaked for several hours in the solution (sometimes for 12 hours); it is then taken out and soaked in lime water for 5 minutes, after which it is allowed to dry somewhat before being sown.

Eau Céleste.

This fungicide is composed of sulphate of copper, ammonia (commercial) and water in the following proportions: 1 ℔ of sulphate of copper, 1½ pints of ammonia and 22 gallons of water. Dissolve the sulphate of copper in about 2 gallons of hot water and when cold, add the 1½ pints of ammonia, then add enough water to make up the 22 gallons. Use for the same purposes as the following.

Solution of ammonia and carbonate of copper.

A highly recommended fungicide against fungous diseases of fruit trees, such as mildew of the vine and gooseberry, scab in apple, plum, cherry trees &c., and rust in strawberries. This solution is formed of copper, soda and water and is prepared as follows, dissolve separately 1 ℔ of sulphate of copper in 2 quarts of hot water, and 1¼ ℔s. of salts of soda (washing soda) also in 2 quarts of hot water, pour the second solution into the first and stir vigorously, let it stand for 5 or 6 hours to allow the carbonate of copper to settle completely to the bottom of the jar, draw off the clear water and you will collect at the bottom of the vessel about 8 ounces of carbonate of copper ready for use.

Paris Green.

Paris green is an arsenite of copper, containing 50 to 60 per cent of arsenic. It is a very violent poison which should be handled with prudence and kept under lock and key. It is a sure remedy against all kinds of insects, but especially against those having mandibles, or gnawing insects. Too strong an application will greatly injure the leaves of the plants. It is used either dry or in a liquid form. To use it dry it must be mixed with 50 to 100 times its weight in plaster, wood ashes, flour or slack lime and this properly mixed is shaken over the plants to be preserved from insects.

For use in liquid form with the pulverizer it is mixed in the proportion of 1 lb of Paris green to 200 gallons of water, but if the foliage is tender (plum, cherry trees, &c.) 250 to 300 gallons of water must be used, as this green powder does not dissolve in water, to mix it properly a small quantity of hot water, is first used with which it is made into a thick pulp which is afterwards mixed with the requisite quantity of water. In its application it must be thrown upon the plants with much force so as to reach all their parts but the operation must be discontinued as soon as the liquid begins to drop from the leaves.

When the liquid mixtures of Paris green (or other insecticides) do not adhere to the leaves of certains plants, such as the cabbage &c., a small quantity of soap suds added to the mixture will have the desired effect ; as the soap water then moistens the leaves.

Alkaline Solution.

This solution recommended by Prof. Saunders, of the

Experimental Farm at Ottawa, is prepared by mixing a strong solution of salts of soda (washing soda) with soft soap, until the mixture has the consistency of pulp. The soft soap may be replaced by hard soap, dissolved in boiling water. Applied upon the trunks of trees with a large brush, it forms an adhesive coating which destroys all gnawing insects and gives vigour to the tree.

THE FRUITERY

THE FRUIT HARVEST

Keeping apples and pears.

The keeping of apples and pears is done in the same way and in the same place, the *fruitery.*

We must however say that pears are much harder to keep than apples, double precautions must therefore be taken in gathering them.

A few words on this subject at once, as it has an enormous influence on the future keeping of the fruit, as well from the time when it takes place, as from the manner in which it is carried on.

The precise time of gathering evidently varies according to the varieties. Those which ripen in the summer or autumn should be gathered from eight to twelve days before they would naturally drop from the trees. At that time the fruit has in itself the necessary elements to accomplish its maturation, as this is now only a chemical reaction, independant of all physiological action. By gathering these fruits at this time they are deprived of sap and they are forced to elaborate more completely that contained in their tissues and they become better flavoured.

Every one knows that a fruit is ready for gathering when in lifting it in the hand the peduncle becomes easily detached from the hull or enlargement to which it is attached The yellow tint on the side of the fruit which is turned away from the sun, also indicates the proper time for gathering.

Fruits which only ripen in the winter and which are the properly called keeping fruit, should be gathered as soon they have reached their full growth and immediately vegetation ceases, that is between the end of september and the end of october according to the variety, the season and the climate. Experience has shown that fruits, left upon the tree after their full growth, are more difficult to keep afterwards; besides they lose their aroma, become more watery by reason of the prevailing lower temperature, which no longer allows of the elaboration of the principles which have come into the fruit, if on the other hand they are gathered before their perfect growth, they shrivel and ripen with difficulty.

In any case the gathering should take place, as far as possible, in dry weather, after the dew has risen between ten o'clock in the morning and four in the afternoon by preference. The fruits are then charged with a smaller quantity of moisture, their flavour is more pronounced and they keep better.

This rule is moreover a general one and applies to all fruit.

The best method of gathering, consists in detaching the fruits one by one and placing them gently in a basket with sides only slightly raised. Deep sided baskets may cause injury to the fruit placed in the bottom.

The fruit should not be subjected to pressure of any kind, for every bruise will produce a brown stain, which sooner or later will bring on the rotting of the fruit.

For fruits near the tops of the trees and out of reach of the hand, it is better to make use of a ladder to enable them to be reached. Various kinds of fruit baskets have been tried, allowing the gathering of the fruits without the aid of a ladder, but they all show disadvantages as well in the slow progress of the work as in the absence of perfection in design.

The fruits are, in fact, always more or les bruised and cannot be kept as long as if they had been gathered by hand.

It may become necessary to gather the fruits during wet weather ; in such case they must not be wiped, as otherwise the bloom which contributes so largely to their beauty and preservation will be rubbed off.

They should simply be spread out side by side upon straw in a dry place until they have become perfectly dry. They may then with all safety be carried to the fruitery.

Building a fruitery.

A well built fruitery should display the following conditions :

1 It should always show an equal temperature, as changes of temperature are prejudicial to proper preservation. They exercise an influence upon the juice of the fruit and may successively either accelerate or retard fermentation and change the interior organization.

2° The temperature should be kept low, higher, it will accelerate maturation ; too low maturation will cease. In the latter case it will be necessary, at the time of the sale or consumption of the fruits to expose them for a longer or shorter period to a higher temperature so that they may ripen, and further the quality of the fruit is always more or less changed.

3° The fruitery should be free from light as it hastens maturation by facilitating the chemical phenomena which produce it

4° All the carbonic acid thrown off by the fruit should be retained in the atmosphere of the fruitery, this gas assisting in the preservation of the fruit.

5° The atmosphere should be rather dry than moist.

6° The fruits should be so placed that they will exercise the least possible pressure the one upon the other.

These various conditions cannot all be found together, except in the construction of a special fruitery, an expense which as a rule can only be incurred by farmers who devote themselves almost exclusively to the raising of fruit.

With most farmers the fruitery is a part of the house, cellar or store room, set aside for this purpose. It should be perfectly healthy, not damp or cold, having a northern exposure by preference with openings fully shuttered and a double door.

During periods of frost, the windows should be sheltered by mats and straw so as to keep the cold from the fruit.

A matter of the greatest importance is the maintenance of a low degree of temperature, varying as little as possible, so as keep the fruit from fermentation which unfavorably hastens the ripening.

The furnishing of the fruitery consists in shelves of white wood or sapin, placed about 10 or 15 inches above one another.

An absolute cleanliness should prevail in the fruitery; an active supervision should be exercised, so that all decaying fruit should be carefully removed.

Care to be given to fruit during preservation.

Upon the care given to fruit during its preservation, the latter largely depends.

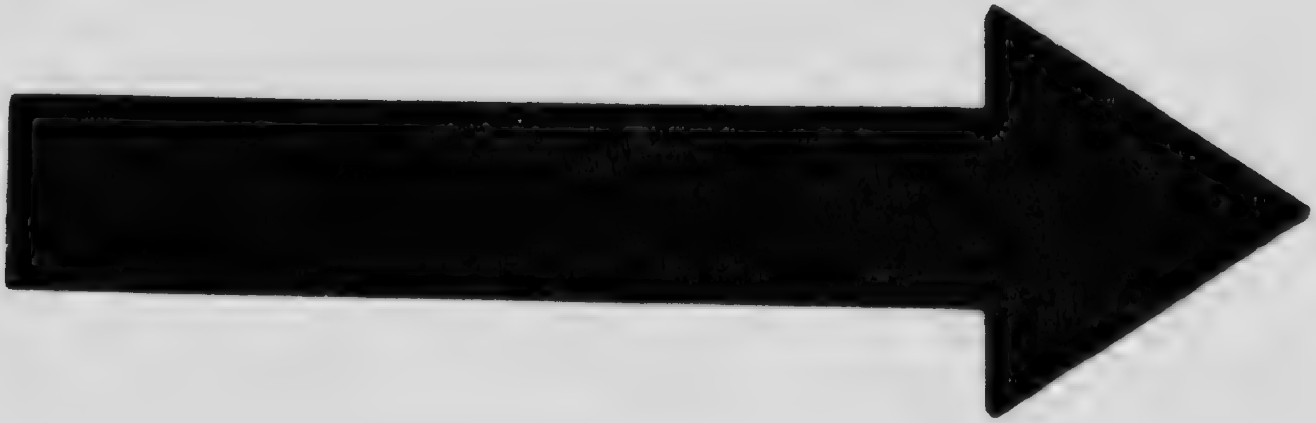
As fast as they reach the fruitery, the fruits are placed upon a table and lightly covered with very dry straw.

There they are picked and each variety is set apart, the stained, wormy or bruised fruits which will not keep are carefully separated. The fruits are then left on the table for three or four days to allow them to loose a part of their moisture.

After this they are placed in rows, with a little space between them so that they may not touch each other.

When the fruits have been arranged in this way the windows and doors are left open during the day, except in wet weather, and this for about a week so as to carry off the superfluous moisture contained in them. This being done, all the exits are hermetically closed and the doors are not afterwards opened except for the interior work of the fruitery.

It is lastly of importance that the fruit should not remain in contact with the damp produced by itself; for this purpose draughts of air more or less powerful are established; but this proceeding has so many disadvantages that it should be



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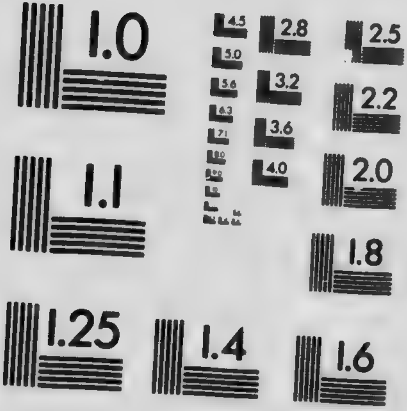

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immediately abandoned. In the very first place a forced change of temperature, always injurious as we have seen, is produced, moreover the ripening of the fruit is hastened through the reception of the temporary light. Besides, this proceeding can only be carried on when the outside temperature is above freezing and in dry weather. But as in winter the contrary is always the case, we find ourselves unable to air and compelled to allow the fruit to remain in contact with the damp air of the fruitery.

As a remedy for all these troubles, we have only to employ chlorure of calcium, which is cheap and has the property of easily absorbing atmospheric moisture.

Quick lime has the same faculty but in a lesser degree ; it has further the disadvantage of combining with the carbonic acid thrown off by the fruit and which, as we have seen, is useful in their preservation.

In using clorure of calcium it may be placed upon glass funnels, standing in any kind of a vessel, so that as fast as it dissolves the salts will run into the receptacle.

Mr. Dubreuil recommends for this purpose a sort of wooden box lined with lead and placed on a table or other support, it must have a certain slope in the direction of its length. A small opening, bored in the middle of its lower side, will allow the liquified clorure of calcium to run off into a vessel placed underneath to receive it.

The fruitery should be often visited so as to remove the fruits which have commenced to spoil and to put apart those which are ripe. If on examination, the peel of the fruit is found to be much distended the clorure of calcium should be renewed if it has completely liquified. If, on the contrary, the fruit is shrivelling, it is because the atmosphere is becoming too dry, in which case the clorure is removed for some time.

Dispatching of apples.

No fruits, says Mr. Moore, but those of good quality and carefully picked over, should be sent away, these are the only ones that will sell at remunerative prices : Great care should be observed in placing them in the barrels, for the finest fruits lose their beauty when negligently packed. The packing should be begun by laying down a range of apples of a uniform size, the upper part ot the apple resting upon the bottom of the barrel, which is then filled by degrees, shaking it lightly from time to time, so as to fill all empty spaces, this is a precaution that must not be neglected. The noise, made by the apples becoming displaced and knocking against one another in a badly filled barrel, is enough to condemn the whole of a consignment. When the barrel is properly filled, the cover is put on and forced into position by means of a press. It is then solidly nailed and the hoops tightened.

The success of the operation depends to a certain extent on the packing; and carelessness on this point often entails serious loss. The barrel is then stamped so as to show the name and quality of the fruit it contains.

Mr. Shepherd, of Como, has experimented with and adopted boxes of convenient size, divided into compartments for each fruit, for the packing of summer apples. By this means he has succeeded in shipping to England Fameuse, St. Lawrence, Duchess and other apples with all the fresh appearance of apples just gathered. This discovery is of great importance, as it opens a paying market to our summer and autumn varieties. Their appearance no less than their fine flavour recommending them to high class consumers as ornaments to the table.

Preserves. — Instead of eating the fruit raw as it is gathered, it is also prepared in various ways. Preserves are a preparation made with the fruit either whole or cut into pieces, and more or less cooked with a quantity of sugar of equal or almost equal weight.

The best preserves are those which, being cooked enough for keeping, retain all the flavour and aroma of the fruit. The way to have them perfect, is to prepare them with the right proportion of sugar. The same as in sirups, if too much sugar is used, they candy, but if too little, not only do they ferment and spoil in the jars, but there are other evil results which deserve attention.

The first is that they must be very much boiled so as to reduce them by evaporation to a proper consistency for keeping; but this prolonged boiling blackens them and gives them a bitter or even more unpleasant taste and causes them to lose the odour of the fruit.

In the second place the expense is really greater when an insufficient quantity of sugar is used. For example: from 5 lbs. of fruit you will obtain about 4 lbs. of juice, add to this, 4 lbs. of good sugar and your preserves so prepared will be without waste and there will be about 7 lbs. of it.

If you only use 2 lbs. of sugar for the same quantity of fruit, you will be at larger expense for fuel to evaporate your fruit and besides there will be considerable waste since instead of 7 lbs. of preserves you have little more than 4. You will therefore have suffered a real loss where you hoped to effect a saving.

These calculations will be appreciated as they deserve by people who practice real economy, and also by those who desire to obtain a clear fine flavoured preserve. As a rule there is everything to gain in not trying to save in sugar and in using only the very best.

Common sugar is not only less agreable to the palate, but it comes higher in price than good sugar, on account of the loss sustained in clarifying and in the skimming during the cooking of the preserves, if the flavour of molasses and a disagreable dull colour are to be avoided. From all this it follows that to obtain the same quantity of preserves with inferior sugar, a larger quantity must be used than the difference in the price between it and good sugar, and the expense is greater. Persons who will take the trouble to weigh the preserves obtained and to calculate the expense, will soon be convinced of the correctness of our calculations and we believe will end by following our advice.

It may therefore be laid down as a rule that the least boiled preserves are the best, provided they will keep. The more sugar they contain the shorter the boiling required. At the same time this rule must not be stretched too far, since, as we have stated above, the preserves will candy if too much sugar is used. We consider that not more than a weight of sugar equal to that of the fruit should be used.

A quick fire is wanted in making preserves so that they will not take long to boil, they should be stirred continually so as to prevent them from burning or sticking to the bottom of the preserving pan, the danger of which is greater when the quantity of preserves is small. They are stirred up and the portions sticking to the sides of the pan are scraped off by means of a spatula or wooden spoon. As froth is formed and rises to the surface it must be skimmed off.

The preserves are cooked enough, when a spoonful on a cold plate, thickens at once. They are then withdrawn from the fire. If they are potted in earthenware jars there is no danger, but if put into vessels of glass, the glass will break unless first heated either by being put into boiling water or warmed by a spoonful of the preserves put into them and spread over the inside of the vessels.

The jars are generally only covered after cooling, usually the following day or the day after that A piece of paper is cut round of the exact size of the inside of the jar, but before placing it on top of the fruit it must be soaked in brandy. The tops of the bottles are also covered with paper soaked in hot water. All the above remarks about preserves are equally applicable to the making of jellies and marmalades and even to a certain extent to the stewing of fruit.

Jellies.—Are preparations of the juice of fruit cooked with about an equal quantity of sugar. When cold they should have about the consistency of soft glue, they should be clear and have the taste and colour of the fruit. Jellies are generally made from viscous fruit containing much juice and mucilage such as gooseberries, cherries and apples. Everything said above, about preserves in general, applies equally to jellies, which are true preserves, except that the fruit is never in a whole condition.

Marmalades.—Marmalades are similar to jellies in that they are never made out of whole fruit, but they differ from the latter in that besides the juice they contain the pulp of the fruit ; they have also a little greater consistency, contain less sugar and are not clear.

Another important point of similarity is that in their preparation all the rules and precautions mentioned in the article on the treatment of preserves generally, may be equally followed.

Stewed fruit.—Is a preparation of fruit, containing a small quantity of sugar and intended to be eaten as soon as cooked and cooled.

Stewed fruit will not keep for any length of time, as the preparation contains too little sugar and because the fruits being almost always whole or nerly so are never cooked completely through.

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